NETWORK WORLD

THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES VOLUME 3, NUMBER 32 OCTOBER 13, 1986

ENHANCED SERVICES

Carriers gird for net clash

Long-haulers vs. locals

BY MICHAEL FAHEY
Staff Writer

The emergence of enhanced network services is creating hairline fractures in the outwardly harmonious relationships between local telephone companies and long-haul carriers. The fractures are the first signs of an impending conflict that will likely shape the future of the industry and spell confusion for users.

Local and long-haul carriers' strategic enhanced network goals are the same, but the means for achieving those goals put the two camps at loggerheads. Both sides are afraid of being relegated to the role of commodity bandwidth provider, and this defensive attitude is actualized in their respective offensive strategies.

As envisioned by local telephone companies, the exchange carriers would provide enhanced services on their switched networks within local access and transport areas and connect these service cells with high-speed, dedicated facilities leased from the long-haul carrier of the customer's

See **Conflict** page 44

INTEGRATED SYSTEMS

IBM minis strengthen Big Blue's family ties

9370s offer Ethernet, Token-Ring support.

BY PAUL KORZENIOWSKI
Senior Editor

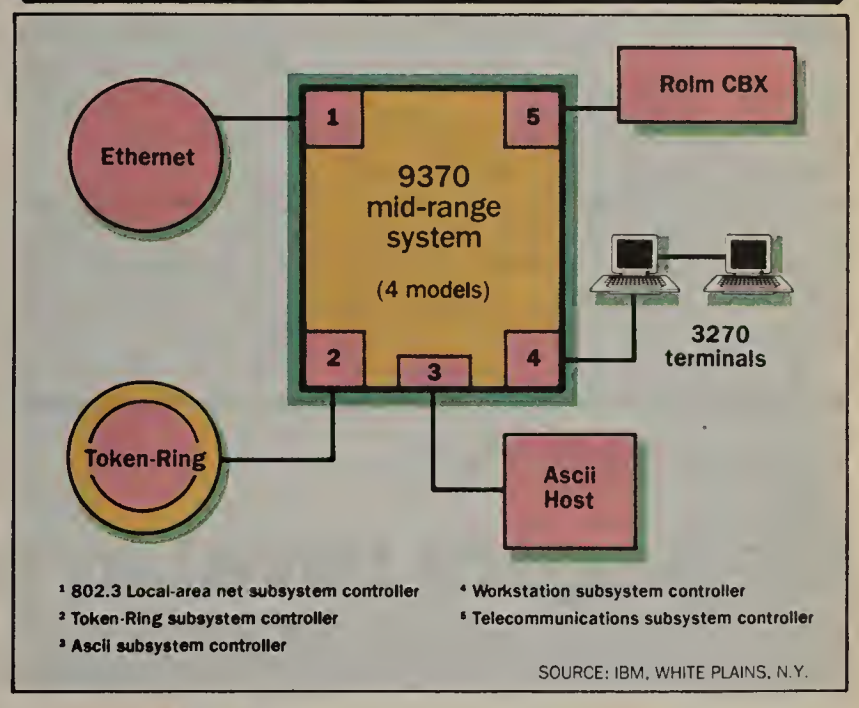
WHITE PLAINS, N.Y. — IBM unveiled last week a mid-range family of processors that offers Ethernet and Token-Ring Network connectivity, supports Ascii devices and does not require external cluster controllers.

The announcement was viewed as a broadside at Digital Equipment Corp., which has prospered at IBM's expense by positioning its computers as a mid-range connectivity solution. The move could help IBM regain lost momentum in the distributed processing arena, but it may also further cloud the company's already muddled office automation strategy.

The 9370 family consists of four models, all based on IBM's 370 architecture and ca-

See **9370** page 8

IBM unveils new mid-range system



SOURCE: IBM, WHITE PLAINS, N.Y.

FEATURE FOCUS

AI systems: Who's the guru?

Networks may one day outguess managers.

BY JEFFREY ROTHFEDER
Special to Network World

Can a lifetime of knowledge be translated piecemeal into the Boolean language of software to create a computerized version of a human expert? That's the underlying notion behind one of today's more successful areas of high tech: expert systems — the sole artificial intelligence (AI) technology that people are actually buying.

Computers that can see via image processing, speak in natural languages or describe objects by merely touching them are still a pipe dream. They are the latest in a long line of overly ambi-

Continued on **page 39**

BARTERING BANDWIDTH

Norwest turns net into profit center

Firm sells communications services to 30 other companies.

BY MICHAEL FAHEY
Staff Writer

DES MOINES, Iowa — Norwest Financial Information Services Group, the communications arm of a consumer finance company based here, is achieving the enviable goal of turning its network into a money-making operation that directly contributes to the corporate bottom line.

The company is reaching that often discussed but seldom realized goal by using its three networks, with some 3,500 drops, to provide data processing and communications services to about 30 consumer credit companies, in addition to serving some 550 Norwest Finance Co. offices.

In 1967, the company, then called Dial Financial, began setting up a network to serve Dial Finance offices throughout the country.

During the early 1970s, Dial management decided to offset some of the network's cost by making it available to other companies in the consumer finance business. Dial was acquired by Norwest Corp. four years ago.

"The top management people decided to get into the service bureau business to take advantage of the cooperative savings on communications costs," said Roger Schrebal, senior vice-president of Norwest Financial Services Group.

See **Profit** page 43

NETWORK LINE

News

AT&T makes its Accunet service usable as a DDS backbone facility by changing tariffs. Page 2.

▼

Vendors push T-3 toward major users as the digital superhighway that will succeed T-1 transmission. Page 2.

Three developers join to expand the capabilities of Apple's Appletalk net. Page 4.

▼

VMX uncloaks a voice messaging system that supports between 12 and 64 ports and provides between 26 and 526 hours of digitized voice storage. Page 6.

▼

Features

Savvy communications managers steer through the network selection process with sharp, explicit planning procedures. Page 34.

NEWSPAPER

▶ AT&T

Tariffs restructured for Accunet digital services

Action should ease net configuration.

BY BOB WALLACE
Senior Writer

WASHINGTON, D.C. — In an effort to provide users with more network configuration flexibility, AT&T last week revised its Accunet tariffs to support Dataphone Digital Services (DDS).

The tariff restructuring will enable customers to use Accunet T1.5 Services as backbone facilities capable of supporting 56K bit/sec DDS or Skynet Digital Service channels as tributary links.

This will limit network redundancy and result in savings for users.

The AT&T option

The user can perform the multiplexing function using his own equipment located on premises or have AT&T provide the capability from its central office switches using the Accunet M24 multiplexing option.

With this option, AT&T can route individual channels within a customer's T-1 facility to different locations.

Philly to Boston DDS channel

The new tariff will enable a user with a 56K bit/sec DDS circuit that runs from Pittsburgh to Philadelphia, and then parallels a T-1 link up to Boston, to establish the Philadelphia-to-Boston DDS channel within the T-1 pipeline.

Until last week, customers who subscribed to both DDS and Accunet T1.5 Service had to obtain separate circuits, even if the lines connected the same locations.

A T-1 line multiplexed to derive 24 64K bit/sec channels could not be used to support a 56K bit/sec DDS channel.

200 T-1 offices to be offered

The new DDS-to-T-1 connection feature will eventually be offered in some 200 T-1 central offices in 23 cities scattered across the nation. It will cost users $20.65 per month.

In a related announcement, the company unveiled volume discounts and a priority use option for its Accunet Reserved 1.5 service.

After seven hours of use per port of AT&T's Accunet Reserved 1.5 Service, users are entitled to a 50% rate reduction.

The increased flexibility of the Accunet T1.5 link might stimulate users who were previously using the service for videoconferencing to support data communications applications over the same link.

AT&T also announced availability of an optional emergency service feature that enables Accunet Reserved 1.5 service users to obtain priority status in emergency situations.

This means that if Company A had reserved a time slot for a videoconference and Company B had a disaster, Company B would be given preference.

Fixed monthly charge

Users can expect to pay a fixed monthly charge of $300 per month for the emergency service function as well as a special call set-up charge of $650 per port in the event of an emergency.

It is estimated that the Accunet Reserved 1.5 terrestrial routing function will cost users $200 per month per port.

▶ CMA CONFERENCE

Managers revel in expanded roles

BY MARGIE SEMILOF
Senior Writer

UNIONDALE, N.Y. — Communications professionals attending the ninth annual conference of the Communications Managers Association here last week took time out from day-to-day rigors to reflect on their ever-expanding corporate role.

Managers say that, as upper management realizes the strategic importance of communications, they are achieving greater stature within the corporate hierarchy. Managers also claim to be better equipped today to deal with complex industry issues, thanks to increasing education and a widening array of information sources.

Edward Woods, data communications manager at New York-based Citibank, N.A., spoke of the increased awareness of communications technology among top-level executives.

"The number of communications options keeps expanding. There are more now than ever before. Senior management is becoming increasingly aware of the strategic importance of communications. It has become a major consideration in all phases of planning, even if for no other reason than cost," he said.

Woods' views were echoed by Tony Mattera, manager of electronic data interchange for Champion International in Stamford, Conn. "Companies are pushing toward developing strategic systems and building direct data channels to customers. Those systems give companies a competitive edge. The role of the manager is to build these networks," he said.

See **CMA** page 6

Table of contents

TOP NEWS

T-1 multiplexers, once on the industry's cutting edge, are being toppled by T-3. **Page 2.**

Sytek offers to beef up network security with new encryption system. **Page 9.**

INDUSTRY UPDATE

Vitalink shows its mettle as it copes with a shifty satellite industry by diversifying. **Page 11.**

TELECOM TRENDS

A Texas-based retail chain discovers hidden details in AT&T tariff practices. **Page 19.**

FACTORY COMMUNICATIONS

Litton assigns plant network staff to conduct double-edged upgrade of manufacturing nets. **Page 21.**

DATA DELIVERY

CEC aims to stake its claim in the T-1 multiplexer market and succeed with low-cost goods. **Page 13.**

COMMUNICATIONS MANAGER

State telecommunications directors unite for ninth annual NASTD Conference. **Page 23.**

NEW PRODUCTS AND SERVICES

NEC America introduces a multiport voice/data device that supports a range of phone features. **Page 29.**

FEATURES

The marriage of optical disk and communications technologies can add order to document management. **Page 41.**

Network World wants to make its news coverage even better, and for that we ask your help. If you know of an interesting event that just occurred or is about to occur, please call. We'd also like to know how you're optimizing your networks. Call Bruce Hoard toll-free at (800) 343-6474.

▶ TECHNOLOGY

AT&T joins surging T-3 tide

Vendors take new products to market.

BY PAUL KORZENIOWSKI
Senior Editor

The technology ante is going up again. Just when you thought your T-1 hand was pat, vendors are playing their T-3 card. So far, though, few users have called.

Last week AT&T became the third manufacturer to announce a T-3 multiplexer, a commercial version of a product it has been selling to telephone companies for roughly six months.

T-3 services are the creme de la creme. The facilities operate at 44.736M bit/sec and provide the capacity of 28 1.54M bit/sec T-1 facilities. A single T-3 pipe can support 672 voice channels.

Telephone companies have used T-3 facilities and equipment to aggregate traffic within their networks for years and now offer these digital superhighways to satisify the needs of a few large companies. Industry analysts say General Motors Corp., IBM and Lockheed are among the few corporations that have tapped the new 45M bit/sec services.

Although T-3 represents a specialized market, a handful of vendors are rushing T-3 products to market to meet the needs of users. At the Tele-Communications Association show last month, Timeplex, Inc., based in Woodcliff Lake, N.J., added a T-3 multiplexer to its line. Last summer, Cohesive Network Corp., based in Los Gatos, Calif., unveiled its CN-2, a multiplexer designed to support T-3 services.

The multiplexers complement the emergence of T-3 services. Earlier this year, AT&T tariffed Accunet T45, and a number of other long-haul carriers, including many of the new fiber-optic carriers, brought out similar offerings. Local telephone companies, including New York Telephone Co., are also testing the waters. Southwestern Bell Corp. is already supplying a select group of customers with T-3 services, analysts report.

The introduction of T-3 facilities reflects the evolving user demand for higher speed, greater capacity services. Since AT&T tariffed T-1 facilities in the early 1980s, the number of T-1 installations has snowballed. Analysts estimate that sales of T-1 multiplexers grew by close to 100% in 1985, and similar growth is predicted for 1986.

T-1 appeals to end users for two reasons. First, the 1.54M bit/sec T-1 services offer 24 times the bandwidth of 56K or 64K bit/sec lines, the highest speed digital service commercially available before the

See **T-3** page 43



Timeplex®

Timeplex, Inc. Woodcliff Lake, NJ 07675 201-930-4600

▶ PC NETWORKS

Appletalk support builds

Three firms show Mac-to-VAX solution.

BY MARY PETROSKY
West Coast Correspondent

SAN FRANCISCO — A team of developers that last week introduced software supporting coprocessing between Appletalk network-connected Macintoshes and Digital Equipment Corp. VAX minicomputers believes Apple has overlooked the potential of its own network.

The three developers — Odesta Corp. of Northbrook, Ill., Kinetics, Inc. of Walnut Creek, Calif., and Alisa Systems, Inc. of Pasadena, Calif. — used last week's Dexpo West conference as the forum from which to launch their joint endeavor. Executives from each company stressed that Appletalk's "robust protocols" and media independence position it to be used for more than just linking Macintoshes.

At Dexpo, Odesta introduced Helix VMX, a version of its multiuser applications generator that runs on a VAX under VMS. Using Helix VMX, Macintosh users who have developed data base-oriented applications with Double Helix, another Odesta product, can now run these applications on a VAX. The VAX functions essentially as a data base server, said Daniel Cheifetz, president of Odesta.

Alisa Systems introduced Alisatalk, a VAX/VMS-based software package that allows a VAX to provide file services and Laserwriter print spooling for Macintoshes. Alisatalk also allows VAX-based applications to send Postscript documents to Laserwriters for printing.

Alisatalk contains a full implementation of Appletalk protocols and acts as a software bridge, so the VAX looks like an Appletalk network to the outside world, said Bob Denny, president of Alisa Systems. Applications on the VAX/VMS system appear to be nodes on an Appletalk network, he said.

This "virtual network" can be connected to other Appletalk networks via a hardware bridge, such as Kinetics' Fastpath/Standalone, or via asynchronous links. Fastpath/Standalone is a hardware gateway between Appletalk and Ethernet networks, providing the physical connection between Macintoshes and a DEC VAX. Alisatalk can be used with Decnet hardware, allowing Appletalk and Decnet data to share the same Ethernet cable.

Coming at the connectivity issue from another angle, Kinetics is working on a direct connection for the Macintosh to Ethernet networks, said Timothy McCreery, president of the firm. McCreery expects the new interface, EtherSC, to be out by December. EtherSC uses the small computer systems interface (SCSI) port typically used to connect disk drives to personal computers.

Kinetics opted to work with the SCSI port because, at 12M bit/sec, it is the fastest port available on the Macintosh, McCreery said. In addition, users can boot their systems from the SCSI port, which is not true of the Appletalk connection, he said.

Charles Berger, president of business development at Apple Computer, Inc., admitted that Appletalk is frequently viewed as an extended printer cable to Apple's laser printers. He noted, however, that there are approximately 200,000 nodes currently connected to Appletalk networks, most of which are server-based.

Apple is overdue in delivering its promised server for the Appletalk network. A source close to the company said Apple has given demonstrations of its own file server and probably will announce it soon. Apple declined to market the server recently introduced by 3Com Corp. for Appletalk. The source believes Apple's decision was based on the fact that 3Com's implementation of the Appletalk protocols and the Xerox Network Services, which 3Com supports on servers for its own network, did not support internetworking, a priority for Apple.

Redefine network testing with the LP-COM TC-2000.

It's the first total network test (TNT) system.

- It's the first data protocol analyzer with powerful dual port operation and split screen capability so you can display two modes simultaneously.
- It offers the industry's best TIMS analog measurement module.
- It features full signaling test capability.
- It offers a combination of digital PCM test functions for advanced PCM/DS-1 testing.
- It does automatic CAROT compatible trunk testing on both small and large networks.
- It has all the computing capability of a full-featured IBM® PC/XT with a 10MB hard disk.
- It replaces up to eight conventional test instruments–at a fraction of the size and weight–*and a fraction of the cost!*

It's incredible

For the rest of the story about the Telecommunications Test System that redefined network testing, please address LP COM, 205 Ravendale Drive, Mountain View, CA 94043. Phone (415) 967-5400.



LP COM

▶ DEXPO HIGHLIGHTS

Networking steals show

BY MARY PETROSKY
West Coast Correspondent

SAN FRANCISCO — Connectivity was the big issue at last week's Dexpo West show, where IBM's booth displays trumpeted the company's new office systems (see "IBM minis strengthen Big Blue's family ties," page 1) as a solution for linking IBM systems with those from Digital Equipment Corp.

While vendors hawked communications solutions on the show floor, DEC users were attending a wide range of sessions at the biannual symposium, which had networking as its theme. A record 6,800 members of Decus, DEC's users group, attended the symposium, according to Sandy Krueger, conference director for Expoconsul International, Inc., sponsors of Dexpo. Dexpo is traditionally held in conjunction with Decus' meetings. Attendance at Dexpo itself was projected at more than 11,000, up more than 10% over last year's West Coast show.

IBM's packaging of its 370 architecture into the smaller 9370 processors, and the fact that the new systems support Ethernet connections, was seen by many as Big Blue's response to DEC's connectivity strategy. Roger Thomas, general manager of Intel Corp.'s System Interconnect Operation (SIO), said, "DEC recognized that the best way to compete with IBM was to provide a connection to it. That's a policy IBM seems to be mirroring."

Intel's SIO was among a number of vendors, including Northern Telecom, Inc. and Odesta Corp., that announced products at Dexpo. Intel will be offering its own IBM-to-DEC connection as part of a joint marketing agreement with FlexLink International Corp.

Intel plans to use its Fastpath

See **Dexpo** page 8

NETWORK WORLD

Box 9171, 375 Cochituate Road
Framingham, Mass. 01701-9171
617/879-0700

Editor
Bruce Hoard
Managing Editor
John Gallant
Features Editor
Steve Moore
Associate Editors
Kathleen M. Cahill
Lisa Guisbond
Senior Editors
John Dix
Paul Korzeniowski
Pamela T. Powers
Senior Writers
Margie Semilof
Bob Wallace
Staff Writers
Michael Fahey, Nadine Wandzilak
New Products Editor
Jim Brown
Washington, D.C. Correspondent
Karyl Scott
1273 National Press Building
529 14th Street NW
Washington, D.C. 20045
West Coast Correspondent
Mary Petrosky
3350 West Bayshore Road
Suite 201
Palo Alto, CA 94303
Assistant Features Editors
Christine Casatelli
Robert Mitchell
Copy Editors
Josh Gonze
Peter Hoffmann
Beth Lazarus
Art Director
Dianne Gronberg
Informational Graphics Designer
Alan Hopkins
Assistants to the Editor
Karin MacIsaac, Cheryl Tynan

Publisher
F. Douglas DeCarlo
Administrative Assistant to the Publisher
Mary Fanning

Production Director
Peter Holm
Senior Production Manager
Leigh Swearingen
Production Assistant
Christopher Cuoco
Paste-Up Manager
Patricia Gaudette
Paste-Up Artist
Peter Kelly
Typesetting Manager
Carol Polack

Board Chairman
Patrick J. McGovern
President
W. Walter Boyd
Executive Vice President
Lee Vidmer
Senior VP-Communication Services
Jack Edmonston
Group VP-Circulation
Margaret Phelan
VP-Finance
William P. Murphy

Second-class postage paid at Framingham, MA, and additional mailing offices. *Network World* (USPS 735-730) is published weekly, except for a single combined issue the last two weeks in December by CW Communications/Inc., 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171.

To apply for a free subscription, complete and sign the qualification card in this issue or write *Network World* at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on information supplied, the publisher reserves the right to reject non-qualified requests.

Non-qualified subscribers: $3.00 a copy; U.S. — $95 a year; Canada, Central & South America — $110 a year; Europe — $165 a year, all other countries — $245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin.

Four weeks notice is required for change of address. Please include mailing label appearing on front cover of the publication.

***Network World* can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zebb Road, Ann Arbor, Mich. 48106.**

***Network World* is distributed free of charge in the U.S. and Canada only to qualified management or professionals who specify and maintain communications equipment and systems, including voice, data and video, as well as to common carriers, consultants, systems houses and manufacturers of communications equipment.**

PHOTOCOPY RIGHTS: Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by CW Communications for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus $.50 per page is paid directly to Copyright Clearance Center, 21 Congress Street, Salem, Mass. 01970.

Permission to photocopy does not extend to contributed articles followed by this symbol. ‡

POSTMASTER: Send Change of Address to *Network World*, Box 1021, Southeastern, Pa. 19398-9979.

Copyright 1986 by CW Communications/Inc. All rights reserved. Reproduction of material appearing in *Network World* is forbidden without written permission. Special requests for reprints and permissions only should be addressed to Nancy M. Shannon, CW Communications/Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171.

"ABC membership applied for"

What we learned about networking from Houdini, Einstein and the Blatta germanis.

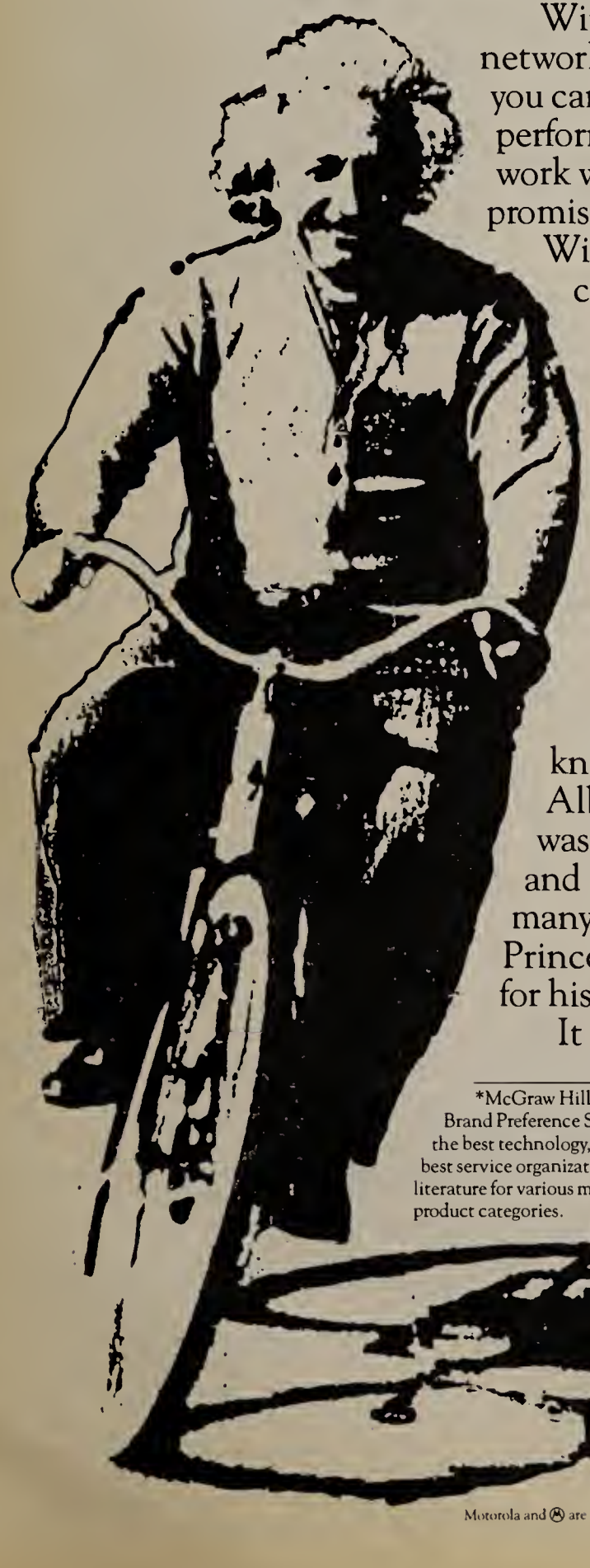
These aren't your average, everyday R&D resources we agree. But as history tells us, the answers to some of the most complex problems can be found in some surprisingly unusual places.

Jack Of All Trades vs. Master Of One.

Harry Houdini was well known for his overall expertise as a magician, but in escape artistry, he was the specialist.

At Codex, we can't help you out of submerged trunks wrapped in chains, but we can help you out of some difficult networking problems like no other data communications company can.

Because in networking, we are the specialists.

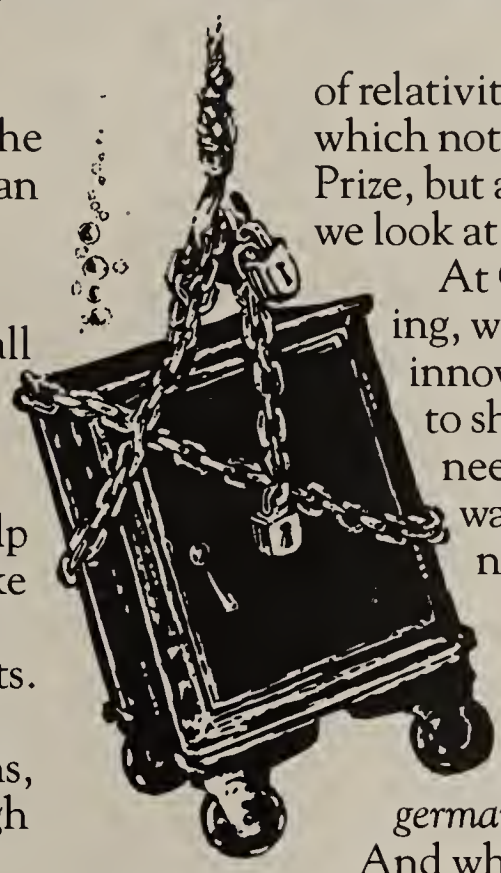


With Codex networking solutions, you can create a high performance network without compromising anything. Without tying completely into a single vendor. Or tying into a vendor that may be better at computing than communications.

Networking and innovation. It's all relative.

We all know what Albert Einstein was famous for, and it wasn't his many rides around Princeton looking for his house.

It was the theory of relativity. An example of innovation which not only earned him a Nobel Prize, but also changed the whole way we look at the world around us.



At Codex, our forte is networking, with emphasis on technological innovation. We, too, have awards to show for it. It's the kind of pioneering that has changed the way the whole world looks at networking.

Only the strong survive.

Last but not least, we've learned a big lesson from a small creature. The *Blatta germanis*, or common cockroach.

And what have we learned from the *Blatta?*

That you have to be strong to survive.

And we have. We've grown strong by being responsive to customer needs, by offering the widest selection of products in the industry—including nearly 200 different modems for leased and dial line operation, multiplexers of all types, local area networks, gateways, switches and network management systems.

And by providing support that rates the highest in the industry.*

In short, we've done it by being the company with the answers.



Blatta germanis (La Cucaracha)

A little book learning.

If you're building a private network, we've got a book that you or your staff might find useful. It's called *The Basics Book of Data Communications*, and it's free if you ask for it before December 31, 1986.

You can get one by calling **1-800-426-1212, Ext 207.** Or you can write to us at: Codex, 20 Cabot Boulevard, Department 707-07, Mansfield, MA 02048.

Ask for your copy today. After all, you never know where you might learn something.

*McGraw Hill's "Data Communications" Brand Preference Study cites Codex as offering the best technology, best price performance ratio, best service organization, and most informative literature for various modem and multiplexer product categories.

codex

MOTOROLA

See us at the Motorola/ISG booth at Comdex, November 10-14

Motorola and Ⓜ are trademarks of Motorola, Inc. Codex is a registered trademark of Codex Corporation. © 1986 Codex Corporation.

News notes

In its efforts to pare down, **IBM** said last week the headquarters staff of its manufacturing and development groups will be consolidated and relocated to Somers, N.Y., by 1988. As a result, the groups' support staffs will be reduced by several hundred employees, who will be offered positions in other IBM organizations.

Headquarters staff in White Plains, N.Y., Montvale, N.J., Danbury, Conn., and San Jose, Calif., are affected by the move, which involves the following groups: Information Systems & Communications Group, Information Systems & Products Group, Information Systems & Storage Group and Information Systems Technology Group. Some 2,500 employees, most of whom work in the Westchester, N.Y., area, will occupy a new building in Somers.

Staffs are also being cut back at **ITT Corp.** and **Burroughs Corp.** ITT is offering an early retirement and severance package to reduce the number of employees at its New York headquarters from 850 to between 350 and 400.

The company said the cutbacks stemmed from its proposed telecommunications equipment joint venture with France's **Cie. Generale d'Electricite.**

In order to boost profits by eliminating duplicated effort, Burroughs plans to trim 9,600 jobs worldwide, or 8% of the combined Burroughs-Sperry work force of 120,000.

The National Aeronautics and Space Administration (Nasa) will launch 20 commercial payloads by 1994, leaving 24 other commercial customers with launch contracts out in the cold.

Among the bumped companies are Hughes Communications Co., a unit of General Motors Corp., which had 10 satellites bumped. RCA Corp. had four satellites removed from the launch schedule.

American Satellite Co., a division of Continental Telecom, Inc., had one satellite removed. Nasa is facing reimbursements of reportedly $40 million to $50 million for down payments made by the spurned companies.

ATLANTA — **Digital Communications Associates, Inc.** last week agreed to merge with **Microstuf, Inc.,** a leader in asynchronous personal computer communications software.

DCA markets a broad line of communications products, including the Irma board, a card that slips into a personal computer and supports personal computer-to-host communications. The company has grown rapidly, due in part to an aggressive acquisition strategy.

Microstuf markets the Crosstalk software product, a highly successful package with over 500,000 copies in use.

Under the agreement, which is subject to approval, DCA will issue 750,000 new common shares of stock.

— Nadine Wandzilak

▶ VMX 5000 SERIES

Voice messager debuts

BY JIM BROWN
New Products Editor

DALLAS — VMX, Inc. unveiled a new voice messaging system last week that supports between 12 and 64 ports and provides between 26 and 526 hours of digitized voice storage.

The VMX 5000 series is geared to replace the older VMX Three system. It features a reduced card set, double-density disk drive, front panel diagnostic display, remote diagnostic capabilities and a 16K bit/sec voice digitization rate that the company claims allows more messages to fit onto a single disk.

The firm also claimed the new system will support personal computer-based system management software and system software that integrates its voice mail with IBM's Professional Office System (Profs) and Digital Equipment Corp.'s All-in-One electronic mail packages.

Also, the firm announced an enhancement to its Voicenet offering, which ties remote VMX Voice Message Exchange systems together. The enhancement, dubbed Turbo Voicenet, transmits recorded voice messages over telephone lines at about 30% faster than they were spoken.

VMX says it used surface-mount technology to place three microprocessors that were found on two separate boards in the VMX Three systems onto a single VMX proprietary microprocessor on the VMX 5000 series.

The VMX 5000's Line Interface Cards display diagnostic information through the system's front panel and can be adjusted with built-in meters. With the new Line Interface Cards and Intelligent Port Controllers, the firm claims the VMX 5000 will process more than 3,000 calls per hour.

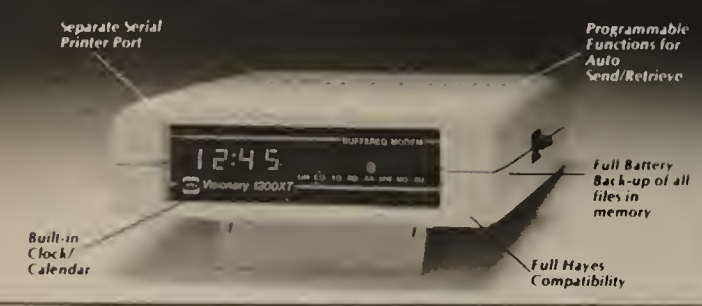
A multiport data link processor board in the system cabinet links the 5000 series to a host mainframe and supports connection of personal computers to the unit. The electronic and voice mail integration package, called the Data Integration Module, communicates through the data link processor to IBM's Profs and DEC's All-in-One.

Profs and All-in-One users receive a message-waiting indicator on their terminals whenever a voice message is received for them. Other software released for the VMX 5000 series includes the personal computer-based VMX Manager package. The three-module package includes the Advanced Analysis Module, which allows managers to access and manipulate system usage and performance reports stored in a data base connected to the main cabinet. The Mailbox Update Module compiles data base updates. A Directory Module supports on-line alphabetical listings of all system users.

The firm hopes the product will convert the red ink seen recently on its financial statements to black.

Pricing for the system ranges from $122,000 for a 12-port version with 26 hours of storage to $300,000 for a 12-port version with 258 hours of storage. A 64-port version with 87 hours of storage is $393,000 while a 64-port version with 258 hours of storage is $499,000. The capability to increase overall system storage to 526 hours will be available in the first quarter of 1987.

THE VISIONARY 1200XT
Communications Controller



The Visionary 1200XT communications controller provides you with advanced features that allow you to send and receive messages or data at any time - even if your computer is turned off! With its Hayes compatible modem, built-in memory buffer, real-time clock/ calendar, and simple English language commands you can:

- Send or receive messages (including TELEX) from your word processor to anywhere in the world.
- Have your modem automatically pick-up messages (EasyLink or MCI Mail) at regular intervals.
- Transmit files error-free using built-in Xmodem file transfer.
- Remotely access your computer and/or incoming messages with password security with or without callback.

Call us today for more details, (415) 751-8811.

Visionary Electronics Incorporated
141 Parker Avenue · San Francisco, CA 94118

CMA from **page 2**

Dixon Doll, chairman and chief executive officer of Ann Arbor, Mich.-based DMW Group, Inc., concurred.

"Telecommunications will be one of the biggest industries of the 1990s. Companies will increase the money they spend in communications to facilitate their own strategic growth," Doll said during a conference session.

The growing corporate dependence on communications has led directly to improved status for communications chieftains, according to Allisandro Cappelli, data communications director at Security Industry Automation Corp.

"I have been with this company for 20 years, and I have never seen communications management get as much recognition as it is getting now," he said.

With that recognition has come a new respect for the technical and management skills of the communications manager. "Every company relies on access to information. Upper management doesn't have the time to deal with the changes in the communications industry. They are relying on us more and more to improve the company's communications systems. Better communications makes everyone's job easier," said Lee Bewley, telecommunications manager at GAF Corp., Wayne, N.J.

Keynoter Dennis Paboojian, president of Rolm Corp., advised users to take advantage of the expanding range of available products and services. He also advised users to spell out their networking needs clearly to vendors.

But to manage multivendor networks, managers said they have been forced to be more sophisticated — and to work harder — in dealing with vendors themselves. "We are not only responsible for administrative duties, but also the technical aspects of the network. And we have to carefully monitor changes in the tariff arena. Communications managers need more and more technical know-how to shop around," said Murkesh Shah, data communications manager for City Federal Savings and Loan in Somerset, N.J.

Rick Meyer, telecommunications manager for Schlot Realtors in New York, said, "I do more reading today than ever before just to keep up. I have to think over every choice four or five times because decisions are becoming harder to make."

Controlling network costs

But despite their changed role, most communications managers still face the mundane but vital fight to control network costs. Patricia Logan, telecommunications manager at Buffalo, N.Y.-based Key Bank of Western, N.Y., said, "It still takes a lot of research just to keep a phone bill down."

We do T1 by the Book.

Introducing the completely compatible CP2000 T1 digital termination from Granger.
It amazes us that some companies try to sell T1 products that aren't network compatible.

We don't know what they expect you to do with them, but we hope it doesn't have anything to do with communications.

The new Granger CP2000 digital termination is compatible with AT&T's standards for their Accunet® services, along with a dictionary of other standards: ESF, CCR, T1Y1, B8ZS, M24, M44, SNA, RS-232, SS #7 and on and on.

Just as important, the CP2000 is ISDN compatible. That makes it an excellent way to ensure the network you design today won't be locked out of the technology developed tomorrow.

Granger's commitment to compatibility is why our client list already reads like a who's-who of long-haul carriers, telephone operating companies and private networks.

The CP2000 digital termination is also flexible. You can mix voice, data and video in any combination, then reconfigure the mix automatically whenever you want. That's an important part of controlling your own communications network. Which is what T1 is all about.

To keep that information clear and accurate over long distances, you can add echo canceling.

To make your network more efficient, you can add ADPCM voice compression and double the amount of voice traffic you can carry.

And to find out more about what our completely compatible new CP2000 digital termination can do, you can write Granger Associates, 3101 Scott Blvd., Santa Clara, CA 95054-3394. Or, call us. Outside California, 1 800 538-8157 ext. 886. Inside California, 1 800 672-3470 ext. 886.

Granger Associates
A subsidiary of USC Communications Industries Corporation

© 1986 Granger Associates
Accunet is a registered trademark
of AT&T Communications.

9370 from **page 1**

pable of running applications designed for IBM's VM and MVS operating systems. These models include the 9373 Model 20, 9377 Model 90 and 9375 Models 40 and 60.

Although the systems were designed as functional equivalents to IBM mainframes, the family does boast a number of firsts.

According to Dave Moschella, a vice-president at International Data Corp., the Framingham, Mass.-based market research firm, the 9370 employs 1M-byte chips and a modular design that allows the use of expansion boards for functions that previously required external devices.

For example, the 9370 family does not need external cluster controllers, such as the IBM 3174. Instead, up to 32 devices can be attached to a workstation subsystem controller, an expansion board that costs $4,200.

The device is priced comparably to the IBM 3174, but analysts expect features to be added to the 3174 that would differentiate it from the subsystem controller. Devices can use either coaxial cable or twisted-pair wiring to attach to the board.

The 9377 Model 90, the most powerful member of the family, can support up to 384 devices.

An optional Ethernet connection, priced at $2,700, was included in the announcements. The 9370 family is only the second IBM processor that supports an Ethernet connection.

The first connection, announced in June, allowed users to hook an IBM Personal Computer RT into Ethernet. At that time, analysts debated just how committed IBM was to Ethernet.

At Dexpo West last week, the company had a 9370 on display under a banner trumpeting it as the "IBM/DEC Connectivity Solution" (see "Networking steals show," page 4).

A third subsystem, the telecommunications subsystem controller, supports RS-232, RS-422, RS-366, CCITT V.24, V.28, V.11 and V.35 interfaces at speeds up to 19.2K bit/sec. An X.21 interface works at speeds up to 64K bit/sec. The subsystem works with Multi-Protocol Adapters, priced at $1,200, or Asynchronous Adapters, which cost $835.

An Ascii subsystem controller can support up to 16 Ascii devices operating at speeds up to 19.2K bit/sec in full-duplex mode.

The controller supports three modes. In one mode, devices retain their Ascii characteristics. In a second mode, the devices are transformed to 3270 series products. A third mode supports 3270 data streams.

A user could connect a Rolm CBX private branch exchange to a 9370 system through either a telecommunications subsystem controller or an Ascii subsystem controller. The Rolm device must be equipped with Rolm Datacom Module or Rolm Data Terminal Interface.

A Token-Ring subsystem controller, priced at $1,950, attaches the IBM Token-Ring Network to a 9370 system.

The design of the new product line may help IBM regain momentum in the distributed application market. Within many corporations, groups of workers operate autonomously. These groups tend to be large enough to warrant their own computer system.

Kimball Brown, an industry analyst at Dataquest, Inc., a San Jose, Calif., market research firm, reported that IBM had done a good job selling into that market until recently, when DEC's VAX line started to take away IBM sales.

One shortcoming of IBM's distributed systems, such as its 4300 series mainframes, is the difficulty of installing them. The 9370 line addresses this problem. IBM said that a 9370 system can be installed in four hours and does not require a systems engineer. In comparison, installation of an IBM 4300 system required 44 hours and a system engineer.

Price, a shortcoming

Another shortcoming was price. The new line, with prices between $31,000 and $210,000, provides better price performance than the 4300 series. However, on the surface, it remains more expensive than competitive offerings. George Weiss, program director for the small computer system services at Gartner Group, Inc., based in Stamford, Conn., said that users should look beyond a surface comparison. The 9370's design enables users to add mass storage easily and inexpensively. As a result, in a typical configuration with the add-on storage, IBM may actually be less expensive than competitive offerings.

DEC did not take long to respond to IBM's challenge. Last Tuesday, the company increased the minimum storage capacity on its VAX 8300 and 8200 systems by one third.

Excelan Networking Series

VMS Users
Connect Your VAX
or MicroVAX to Ethernet
with TCP/IP



- Complete solution
- Applications: Mail (SMTP), FTP, TELNET
- Hardware: On board TCP/IP and TELNET Server with 512K RAM
- Development library: A QIO programming interface
- 1 year warranty on hardware
- Field proven, hundreds of VAX customers
- Unbeatable price performance

For all the details to suit your individual needs,
Call 800-EXCELAN or 800-521-3526 in Calif.

EXCELAN

2180 Fortune Drive, San Jose, California 95131 Fax 408-434-2310 Telex 176610

Dexpo from **page 4**

hardware to provide high-speed connections between IBM hosts and a number of other devices and systems.

With Fastpath and the FlexLink software, users will be able to channel-connect IBM 4300 and 30 series mainframes to VAXes.

This combination of hardware and software will provide nearly 1M bit/sec of data throughput, Thomas said.

The FlexLink software converts data from IBM formats to DEC formats on the fly, so users can access both systems from one terminal and work with data from a target host on their native host. This approach of stripping off protocols and piping packetized data over a physical link will be used in providing a range of other connections, Thomas said.

Fastpath incorporates a Multibus interface with six slots, so it is capable of supporting a mix of host computers, local-area networks and peripherals, Thomas said. The IBM-to-VAX connection is due out in January 1987, and will be followed by support for the Manufacturing Automation Protocol, he said.

Although both Intel and FlexLink will be selling the IBM-to-VAX connection product, Intel will provide all service and support, he said.

Northern Telecom used Dexpo to launch an $895 integrated voice/data terminal, the Displayphone 220, that emulates DEC VT220, VT100 and VT52 terminals. Designed for such applications as telemarketing, customer service and purchasing, the Displayphone 220 features a larger keyboard and screen than previous Northern integrated voice/data products, said Bob Burke, director of market development.

Northern Telecom teamed up with terminal maker Wyse Technology, Inc. to codevelop and manufacture the terminal. The Displayphone 220 operates with a range of manufacturers' private branch exchanges and central office systems and is available with an optional $200 212A Hayes-compatible modem that can operate at 300 or 1,200 bit/sec.

Correction: The one-time service charge for AT&T's Custom Switched Network Service was listed incorrectly in the Sept. 29 issue of *Network World*. The charge is $10.

NETWORK WORLD

THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES

Use the
attached form
to get your own
FREE subscription
to
Network World.

You can also use the form to make
any necessary changes to your name
and address.

▶ NETWORKING

Sytek's new data encryption system strengthens local network security

Company hopes product's low cost and ease of use will attract risk-conscious commercial users and government agencies.

BY MARY PETROSKY
West Coast Correspondent

MOUNTAIN VIEW, Calif. — With the zeal of a missionary, Sytek, Inc. is addressing what it perceives to be one of the most overlooked issues of local-area networking: security.

The company last week introduced the Secure 2000 data encryption system for its System 2000 local-area network. Sytek believes the product will appeal to commercial users as well as its primary audience — government agencies and defense contractors — because of its low price and ease of use. Universities, banks and health care facilities are among the commercial organizations Sytek is targeting with the security system.

As the number and size of local networks grow, corporations are realizing much data is exposed because it can be tapped as it travels along the network, according to Ken Bauer, Sytek's federal marketing manager. Network monitors and test equipment can be used to tap local networks, or users can hotwire a network interface unit to intercept packets intended for other addresses.

> *"As the number and size of local-area networks grow, corporations are realizing much data is exposed."*

Sytek points to a study by the Data Processing Management Association (DPMA) to emphasize that companies face the gravest security risks from their own employees. A 1985 DPMA survey of 1,000 of its members revealed only 2% of computer crimes were committed by outsiders. The DPMA also estimates that for every one reported incident of computer crime, 45 incidents go unreported.

"We now have to start thinking about large local-area networks as a hostile media," Bauer said. The Secure 2000 products use the National Bureau of Standards' Data Encryption Standard (DES) algorithm. The system provides end-to-end data encryption, so users on the network can establish a secure session with any other asynchronous device or host. This contrasts with most other security systems available, according to Bauer, that provide data encryption on a point-to-point basis only.

Secure 2000 can also be used to create secure subnetworks, providing data privacy among small work groups on the larger network. These secure subnetworks cannot be accessed or reconfigured by other users within the main network. Users on the Secure 2000 can choose between an encrypted or unencrypted session.

Advanced Research Corp., a consulting firm catering to the government and military, has tested a pilot Secure 2000 network and is currently installing one for a client. The encryption system works well, has proven to be reliable so far and does not noticeably degrade network performance, said Bob Todd, president of the Vienna, Va., firm.

"No other vendor has a public offering that provides any kind of encryption," Todd said. He sees Sytek as aggressively pursuing a market most broadband local-area network vendors have ignored.

Todd, however, points out — and Sytek acknowledges — that the Secure 2000 is a relatively basic encryption system.

"For the broad range of commercial [security] requirements, DES is sufficient," he said. However, DES does not allow for the segregation of data into different classifications. Todd said this type of multilevel security on networks is needed in government and military sites. "Multilevel security is still elusive — to my knowledge there is nothing commercially available to provide multilevel security on a network," he said.

In pursuing the commercial market, Sytek may have to overcome the attitude expressed by a systems manager in a major Northern California bank who believes encryption is overkill. Like homeowners balking at the price of flood insurance, many corporations don't see any real value in making their data networks more secure. Protecting its data has not been a concern for the bank, which relies on password and access restrictions for security, the manager said. Although the bank has used encryption in limited applications, it appears to be an unnecessary expense, said the manager, who asked not to be named.

Sytek hopes the low cost of its system — which averages $150 per port more than its regular System 2000 components — will convince commercial users to reexamine their security needs.

The Secure 2000 consists of several components. The 2503 Secure Packet Communication Unit, priced at $1,495, is a two-port device that performs data encryption. The 2533 Secure Modular Packet Communication Unit is a multiport device available in configurations from eight to 32 ports. Pricing for the eight-port version is $5,395, with each additional two-port interface card priced at $895.

In addition, users need a Key Distribution Center (KDC), which generates, logs and distributes a unique data encryption key for each secure session. Session keys are randomly generated numbers; in addition, there is a master key that enables the KDC to identify each secure device on the network. The KDC rejects all unauthorized attempts to access its memory across the network. It consists of three boards and software designed for use with a dedicated IBM Personal Computer AT or compatible. Pricing for the KDC, not including the personal computer, is $4,995.

Excelan Networking Series

UNIX Users
Connect Your VAX, NCR Tower and Others to Ethernet with TCP/IP



- Complete solution
- Applications: Mail (uucp), FTP, TELNET, R-Utilities
- Hardware: On board TCP/IP and TELNET Server with 512K RAM
- Development library: A socket programming interface
- 1 year warranty on hardware
- Field proven, thousands of installations
- Unbeatable price performance

For all the details to suit your individual needs,
Call 800-EXCELAN or 800-521-3526 in Calif.

EXCELAN

2180 Fortune Drive, San Jose, California 95131 Fax 408-434-2310 Telex 176610

Get 2.5x the X.25 for your money.

Introducing Xtra.25™ access equipment.





Our innovative design reduces hardware inventory. One box becomes many X.25 products with our FEATUREPAK™ software cartridges.



When it comes to X.25 network OEMs and system integrators, MICOM doesn't have its head in the clouds. Our 2.5-to-1 price/performance edge will give your network no-nonsense advantages your customers will appreciate.

MICOM X.25 access equipment is already in use on virtually every public X.25 network in the world.



As packet switching networks grow in number, so does the number of X.25 access equipment vendors. But only one has enough X.25 experience and manufacturing capacity to provide a full line of components at reasonable prices. That's MICOM, the largest volume datacomm manufacturer in the X.25 access equipment market.

Our async central site PAD provides access to public data networks for up to 24 async devices or acts as an X.25-to-async adapter for non-X.25 hosts. Our X.25 async local PAD has similar functions for up to 16 users. And it is fully compliant with CCITT 1984 standards. Our X.25 sync PAD links 3270 users into packet switched networks. And MICOM provides on-demand 72 kbps high speed network access.

Our X.25 packet switch can work as an X.25 device concentrator or as a switching node. What's more, Call Accounting for each link is fully automatic and comes at no extra cost.

XCC,™ our X.25 Control Center, can be used to configure, monitor or troubleshoot any location, anywhere along your network.

Of course, MICOM does all the extras an OEM or systems integrator appreciates. Simple things that our competitors conveniently forget, like prices that allow you to build in better margins for yourself.

Find out more now. Just call our X.25 Sales Group for application assistance and answers to any other datacomm questions.

MICOM. We have all the products, prices, performance, and people necessary to change your current X.25 vendor into an ex-25 vendor.

1-800-MICOM-US

DATACOMM BY MICOM

More ways to help computers do more.

MICOM Systems, Inc., 4100 Los Angeles Avenue, Simi Valley, CA 93062-8100.
Europe: UK (44) (635) 832441. Int'l: USA (1)(805) 583-8600.

XCC, FEATUREPAK, and Xtra.25 are trademarks of MICOM Systems.

INDUSTRY UPDATE

"Thirty-two months after divestiture, AT&T seems to be finding its way. The company has moved through difficult product cycle transitions in customer premises equipment as well as in networking equipment for telephone companies. AT&T was rapidly losing share in both these market segments. It has since recovered in a difficult pricing environment. We believe the company's ambition to become the vendor of choice for supplying information movement and information management on an international basis is lofty but achievable.

From "Telecommunications Equity Research"
E.F. Hutton and Co., Inc.
New York

▶STRATEGY

Vitalink expands realm

Shifts in satellite industry spur product diversification.

BY PAM POWERS
Senior Editor

MOUNTAIN VIEW, Calif. — Vitalink Communications Corp. is showing chutzpah as it grapples with chameleonic changes in the satellite market.

A provider of private satellite networks, the company last week announced its plans to develop new data communications products with $5.5 million from recent equity financing and is already testing its wings in the nascent very small aperture terminal market.

The private satellite network market, which grew rapidly in its infancy, has more recently undergone upheaval. Companies such as Equatorial Communications Co. suffered diminishing returns after rapid expansion and were forced into emergency evaluation of their marketing strategies. Vitalink chose to expand into new areas while maintaining its commitment to the satellite business.

Now the company derives a hefty portion of its annual revenues from a group of data communications products introduced as an antidote to slumping network sales. In addition to its private satellite networks, Vitalink now markets TransLAN, a product that interconnects local-area networks across satellite links or terrestrial lines and allows intercommunication regardless of protocol. This product, in conjunction with TransLINK, a frame-level multiplexer, and TransSDLC, a communications software package, now contribute approximately 50% of the company's annual revenue.

But Vitalink still has a heavy investment in the Vsat market. New players with deep pockets changed the nature of the game in the high-end satellite network market. Network sales typically involved thousands of nodes with a central hub carrying a steep $1 million price tag. Paul Schaller, vice-president of marketing and sales at Vitalink, said Vitalink saw a neglected niche in the sale of networks to small and mid-range users.

Thus was the Vsat product line born. The Vitalink Vsat private satellite network operates in Ku band, allowing small, 1.8-meter earth stations.

If the company's calculations are correct, thousands of users can benefit from a small satellite network that operates at 56K bit/sec and 19.2K bit/sec and is backed by full company support. A lot of Vitalink's money is resting on that assumption.

Thus far, Schaller said that the TransLAN product has provided an entree to many new accounts, who, perceiving the value of long-distance local net interconnection, have gone on to purchase a Vitalink Vsat network.

In addition to direct sales, Vitalink has developed a lucrative relationship with Digital Equipment Corp. DEC comarkets TransLAN through its own sales catalog, and Schaller said a large proportion of TransLAN sales are contributed by the DEC connection. Vitalink is now actively pursuing systems integrators and value-added resellers as a distribution channel for its data communications products.

Bill Reed, director of research services at Link Resources, Corp., New York, said Vitalink's move to the Vsat market doesn't surprise him. "The Vsat market for two-way data communications hasn't really even started yet," he said. Equatorial may pose a threat, but to his knowledge, few other Vsat products are up and running.

That may give Vitalink the competitive edge it needs to compete in a market that will most likely soon be glutted with stiff competition.

INDUSTRY EYE

LARRY H. NEBEL

Data base at crux of system control

As the job of managing communications systems has grown, so too have the problems. Why? It boils down to system integrity vs. component integrity.

In today's multivendor environment, the many vendors contributing equipment to a user's network are concerned with the integrity of the components they have supplied. The responsibility for peak system performance and end-to-end system integrity falls squarely on the shoulders of the in-house MIS and telecommunications management teams.

What does this mean for network management? It means finger pointing, costly system outages, prolonged downtime and false dispatch charges.

To curtail such problems, a robust information data base is a must. Relational data base management systems provide simple, rapid access to tables of information needed to address the many facets of ensuring system integrity. Effective network management cannot be accomplished without information from problem diagnosis to problem reporting to vendor dispatch and overall system management.

Locating a device for repair can also go beyond simple rack and floor coordinates. Building access information is often required. For example, after hours or on holidays, who authorizes access to the building? Who has the key to the computer room? Repairs can be delayed for many hours if a service technician can't get to the faulty device.

> *"Ongoing records arm owners with bargaining power when renewing contracts."*

Network owners also need to store information on vendor contacts. Knowing the chain of command in each vendor service organization facilitates escalation.

It is also useful to keep vendor contract information in a data base so vendor service performance can be measured against the service contract. Ongoing records arm owners with substantial bargaining power when it comes time to renew contracts.

The need for information data base capabilities does not stop with fault isolation and equipment restoral. Incident tracking and archiving is a key information activity. Incident tracking allows the generation of reports gauging the health of a communications system and equipment performance levels. With the appropriate data base, network managers can spot problem areas indicating degradation or traffic overload. Information goes hand-in-hand with invention.

When the source of a problem is accurately determined, infor-

See **Management** page 12

Nebel is vice-president of marketing for Pactel Spectrum Services, Walnut Creek, Calif.

▶LABOR

Strike update

Federal and state mediators last week began meeting with the striking Connecticut Union of Telephone Workers (CUTW) and Southern New England Telephone (Snet) to end a 24-day-old strike by the 9,600-member union.

Before both sides agreed to mediation, the company announced that it had hired 300 temporary directory assistance operators, and the union asked the Connecticut Department of Public Utilities to investigate whether rebates could be given to customers to compensate for telephone company service during the strike, according to Rick Melita, CUTW spokesman.

Meanwhile, some 400 members of the Communications Workers of America continued their more than two-week-old strike against Nynex Corp. Members of the clerical unit work on Nynex telephone directories. Early this month, members voted five to one against a company proposal that contained no job protection, according to Julie Comperchio, president of CWA Local 1302 in Lynn, Mass. The next day the company presented essentially the same proposal, she said.

Nynex said informal negotiations were continuing.

Management from **page 11**
mation is once again vital to the process of reporting trouble to the appropriate vendor. The results of initial testing must be recorded and reported to vendor service technicians to initiate the repair process. If trouble reports are communicated in technical terms, with symptoms clearly spelled out, the vendor has a much better chance of rapidly restoring service.

Effective service dispatch relies on more than detailed problem reporting. It is critical for the service vendor to know the serial number, revision level and location of the faulty device. Knowing device revision levels can mean the difference between bringing the appropriate spares and prolonging system downtime.

Failure to report device location can cause delays in service restoration. When service technicians are given precise information regarding device location, time isn't wasted searching for the right floor and rack location.

No longer is the voice and data world straightforward enough to allow problem-solving by intuition. In the days of the simple system, if a problem was not in the modem, you could be 99% sure it was in the line. Not so anymore. Layers of complex applications and system configurations can sometimes turn the troubleshooting process into a "ghostbusters" mission. Problem diagnosis requires knowledge of both the physical and logical connections within a communications system.

> *"Problem diagnosis requires knowledge of both the physical and logical connections within a communications system."*

As fate would have it, network managers are rarely faced with a clean break. Clean breaks are easy to spot and much easier to fix than advanced or intermittent problems. Trouble analysis must be completed based on the assessment of as much information as possible. Troubleshooting is easiest when an information data base containing the complete system inventory can be used to graphically depict the system configuration in real-time. With such an information tool, troubleshooters can set the system in its entirety, a critical requirement for maintaining overall system integrity. Without easy access to an accurate and comprehensive system inventory data base, the diagnostic process involves time-consuming manual steps of tracing the system link by link.

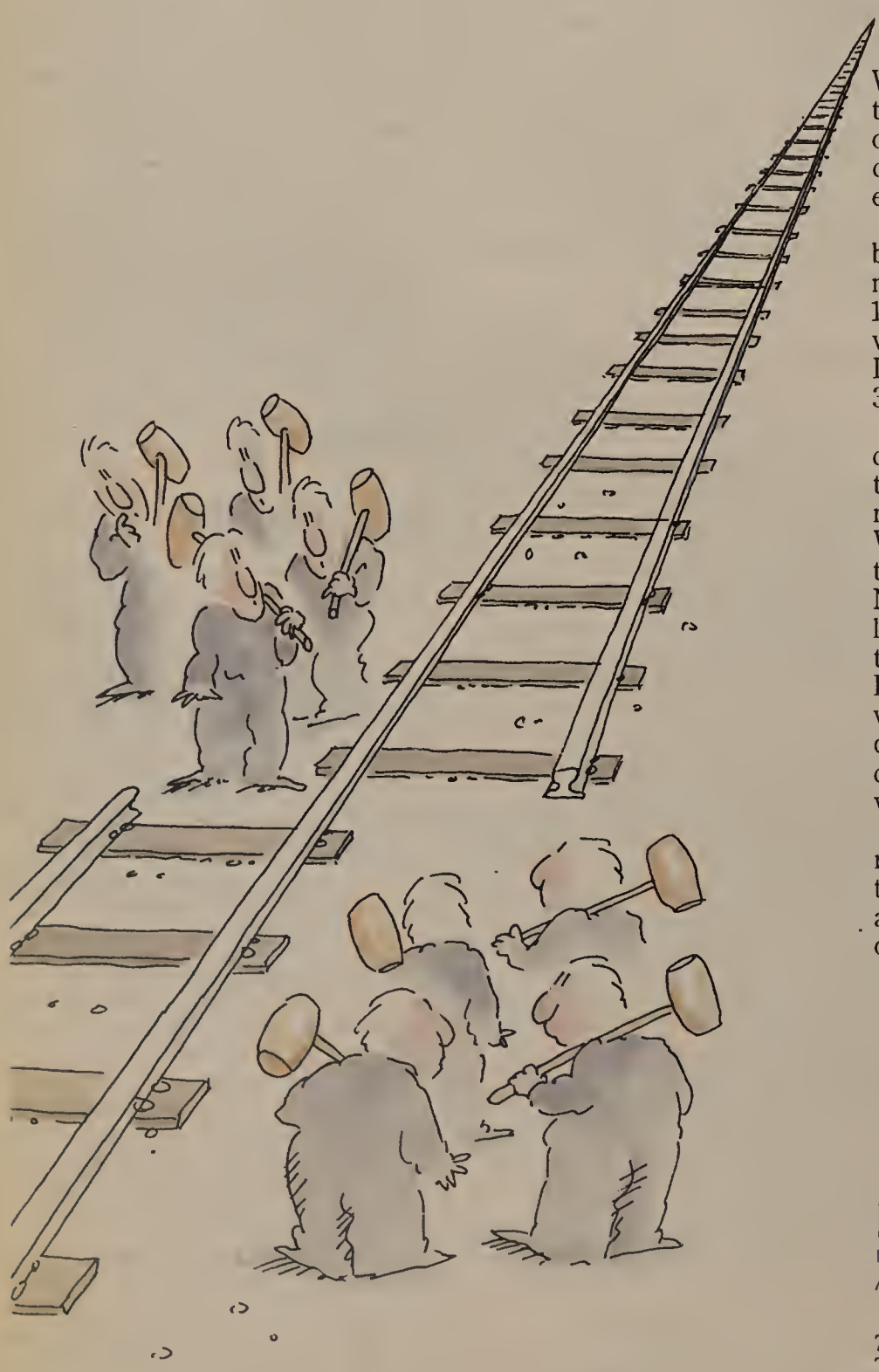
Inaccurate problem isolation

If the problem vendor is not accurately identified the first time, false dispatches result. As false dispatch calls become more frequent, vendors will exercise the contract clause that calls for payment. On an average, network owners are faced with charges of around $240 a call. Yet network managers in most organizations rarely see these bills because bills of less than $500 are usually paid by accounts payable — no questions asked.

> *"Layers of applications can sometimes turn the troubleshoot into a 'ghostbusters' mission."*

False dispatch charges can add up fast. The amount expended here could be better spent on solutions that ensure accurate problem diagnosis.

When a vendor is incorrectly dispatched, time spent for the wrong vendor to come back with a "No Trouble Found" report adds unnecessarily to outage duration. In an effort to help owners as they go back to the diagnostic drawing board, the dispatched vendor might suggest where they think the problem lies. Voila: Finger pointing. It is as much the fault of the owner not having sufficient information to properly isolate the source of a problem as it is the fault of the falsely dispatched vendor who appears to be pointing a finger when suggesting who the owner may want to call in next.



WHEN IT COMES TO BUILDING WIDE-AREA NETWORKS, THERE'S NO SUBSTITUTE FOR EXPERIENCE.

While any number of companies can offer to sell you a private wide-area network, one company can offer you 25 years of computer and communications experience along with it. BBN Communications.

Experience that includes designing and building the world's first packet-switching network for the U.S. government back in 1969. Since then, it has evolved into the world's largest wide-area network, the Defense Data Network, connecting over 30,000 users throughout the world.

But the U.S. Government isn't the only customer with tough networking problems that BBN has helped to solve. Numerous major corporations, among them Wang, Weyerhaeuser, and MasterCard, not to mention European giants like England's National Westminster Bank and Italy's largest corporation, ENI, have also found the answers they were looking for from us. Each came to BBN with a unique networking problem—from integrated voice/data transmission to electronic mail to credit authorization—and each came away with a unique networking solution.

If you're going to make a major commitment to a wide-area network vendor, only three things count. Experience, experience, and experience. In wide-area networking only one company delivers it all.

SHOULDN'T YOU BE TALKING TO BBN?

BBN Communications

A Subsidiary of Bolt Beranek and Newman Inc.

70 Fawcett Street, Cambridge, MA 02238
Telephone 617-497-3268 Telex 921470

bbn

DATA DELIVERY

"Users are becoming disgusted with current T-1 offerings. Vendors talk a lot about features their products offer, but users are really interested in which applications the multiplexers can support. The result is that users are confused and frustrated. They aren't sure which features are important and are unable to determine which product they should recommend for their corporate networks.

Timothy Zerbiec
Vice-president
Vertical Systems, Inc.
A T-1 consulting firm in Dedham, Mass.

T-1 MULTIPLEXERS

CEC enters fray

Firm to compete on price in crowded mart.

BY PAUL KORZENIOWSKI
Senior Editor

ANDOVER, Mass. — Communications Equipment Corp. (CEC), a start-up firm, hopes to carve out a niche in the crowded T-1 multiplexer market by offering inexpensive products.

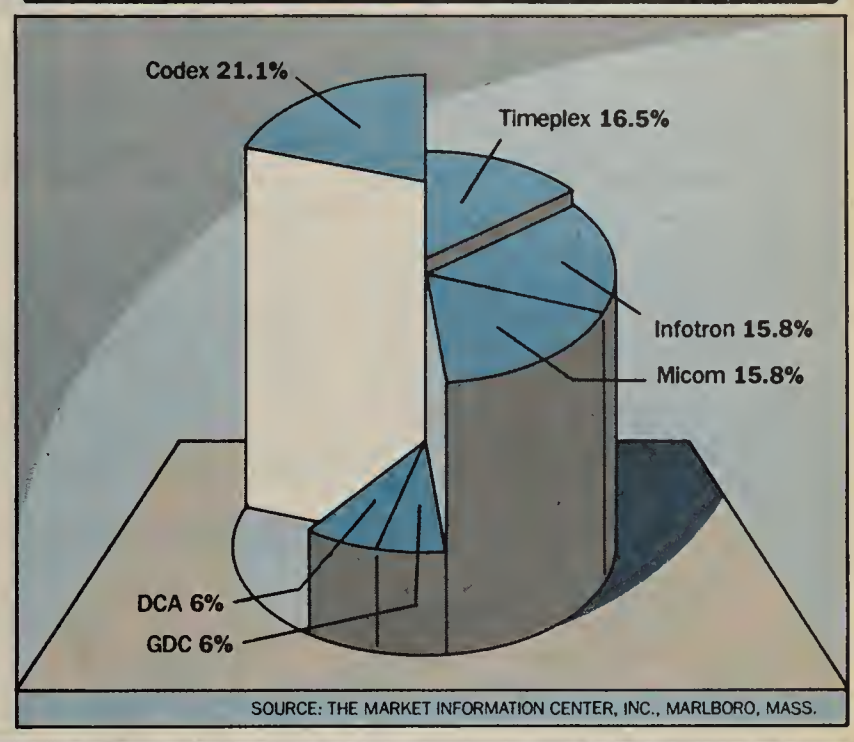
Timothy Jones, CEC's chief executive officer, acknowledged that the T-1 market has become very crowded and a shakeout is possible even before the company delivers its first product in approximately two years. But Jones said he does not believe the shakeout survivors would be able to lock up the entire T-1 market.

New players will be able to gain a foothold in the market in a couple of ways. One method is to attract the attention of larger companies and enter into potentially lucrative OEM agreements. Jones acknowledged that CEC was seeking OEM partners but declined to say whether the company had experienced any success.

New companies also will be able to gain market share if they bring something new to the table. Lower price is one feature that CEC plans to offer, according to Jones. "Currently, cost is not a critical purchasing issue for most T-1 users," he said. "In a few years, after users have become familiar with the technology, cost will become one of the most important considerations."

See **CEC** page 14

Who makes the best statistical multiplexer?



SOURCE: THE MARKET INFORMATION CENTER, INC., MARLBORO, MASS.

DATA DIALOGUE
DONALD CZUBEK

IBM must adopt and adapt to new standards

Lately, IBM has been talking more about support for international standards than for proprietary protocols like Systems Network Architecture and Document Interchange Architecture. This shift raises questions about IBM's perception about International Standards Organization's Open Systems Interconnect (OSI) protocols. Will IBM abandon proprietary technologies in favor of these standards? Could both network models be supported within IBM's product line?

Coexistence is really the only viable alternative for IBM. There are several reasons for this. First, IBM has an enormous installed base of SNA-based hardware and software products. These products require ongoing support and enhancements. Clearly, IBM cannot drop support of its proprietary technologies because it would stand to lose a significant number of customers. Because of the large SNA base, IBM must continue to base products on its proprietary communications protocols.

A second reason why IBM will continue to support its own architecture stems from its position in the industry. Standards level a playing field. If you're the leader, why play on a level field? IBM dominates the market. To continue this domination, it has to continue to develop new products and not simply react to standards when they become available.

For example, if IBM did not introduce SNA in 1974, 10 years would have passed before it delivered its first networking products. Clearly, IBM's customer base would be much smaller if that scenario had been followed. Consequently, users can be assured that IBM will continue to use SNA technologies to differentiate its products from those of its competitors.

On the other hand, standards offer tremendous benefits to network managers. Contrary to popular belief, they do not pose a threat to IBM, which, no doubt, will become the largest single supplier of OSI-based products in the industry. Currently, OSI development work is under way at IBM laboratories in Rome, La Gaude, France, and Palo Alto, Calif.

See **Coexistence** page 18

Czubeck is vice-president at Communications Solutions, Inc., a San Jose, Calif., communications software vendor.

MULTIPLEXERS

Codex cops top kudos

Market user survey just released.

BY PAUL KORZENIOWSKI
Senior Editor

MARLBORO, Mass. — Users rated Codex Corp.'s line of statistical multiplexers as the best product on the multiplexer market.

That was one of the findings in the recently published "The Multiplexer Market 1986," a 30-page study completed by Market Information Center, Inc., a market research firm here. When users were asked who makes the best overall product, Codex garnered 21.1% of the responses. Timeplex, Inc., Micom, Inc., Infotron Corp., General DataComm Industries, Inc. and Digital Communications Associates, Inc. (DCA) followed Codex.

Users said the three most important buying considerations for statistical multiplexers were reliability, customer support and ease-of-use. Other important items were features, field service, manufacturer's reputation, maintenance costs and price. One surprising finding was that a diverse product line played a small role in the selection decision.

Approximately 400 companies were represented in the survey, and 62% of the respondents used multiplexers in their networks. The average size of the companies' networks was 244 voice lines and 114 data lines, 18 of which were multidrop lines.

The survey divided multiplexers into statistical and time division categories. Market share for statistical multiplexers was divided into five categories.

Micom lead the low end of the market — two to eight channels — with 22.2% of the market. Codex, Timeplex and Infotron followed with 15% to 10% shares.

Codex led the next tier — eight to 16 channels — with 18.6%. Micom and Infotron, each with 13.6%, were nipping at Codex's heels.

Timeplex was No. 1 in the 16- to 32-channel segment with a healthy 25% share of the market. Codex with 13.5%, DCA and Infotron both with 9.6% and Tellabs, Inc. with 7.7% rounded out the top five.

Timeplex also lead the 32- to 64-channel market with 26.9% market share. Tellabs, Infotron and DCA each had 11.5% of the market.

Codex and Infotron, both with 25% share, topped off the high end of the market, those tools handling more than 64 channels. Timeplex, DCA and Micom followed.

Users listed modularity as the most important consideration for purchasing a statistical multiplexer. That item garnered a 4.2 rating on a scale of 1 to 5.0. Larger buffer size, network management and network performance monitoring were listed as other important buying considerations. The lowest rating was given to protocol conversion capability.

Synchronous Data Link Control, with 39% of the current traffic,

See **Multiplexers** page 18

▶TOKEN RING

Proteon unveils net management duo

NATICK, Mass. — Proteon, Inc. recently unveiled a network management system for its Pronet-10, a token-ring local-area network.

The offering consists of two products: the Token Ring Monitor and the Token Ring Analyzer. Together, the products supply a network manager with data and control functions so he can monitor network performance on Proteon's token-ring network.

The Token Ring Monitor, a single expansion card that fits in an IBM Personal Computer, tracks activity on a network. The product identifies capacity thresholds and notifies an operator when a threshold may be overstepped. Operators are also able to troubleshoot a network and determine where a problem may reside. The names of users are displayed on the network management terminal, which can be used for security and maintenance.

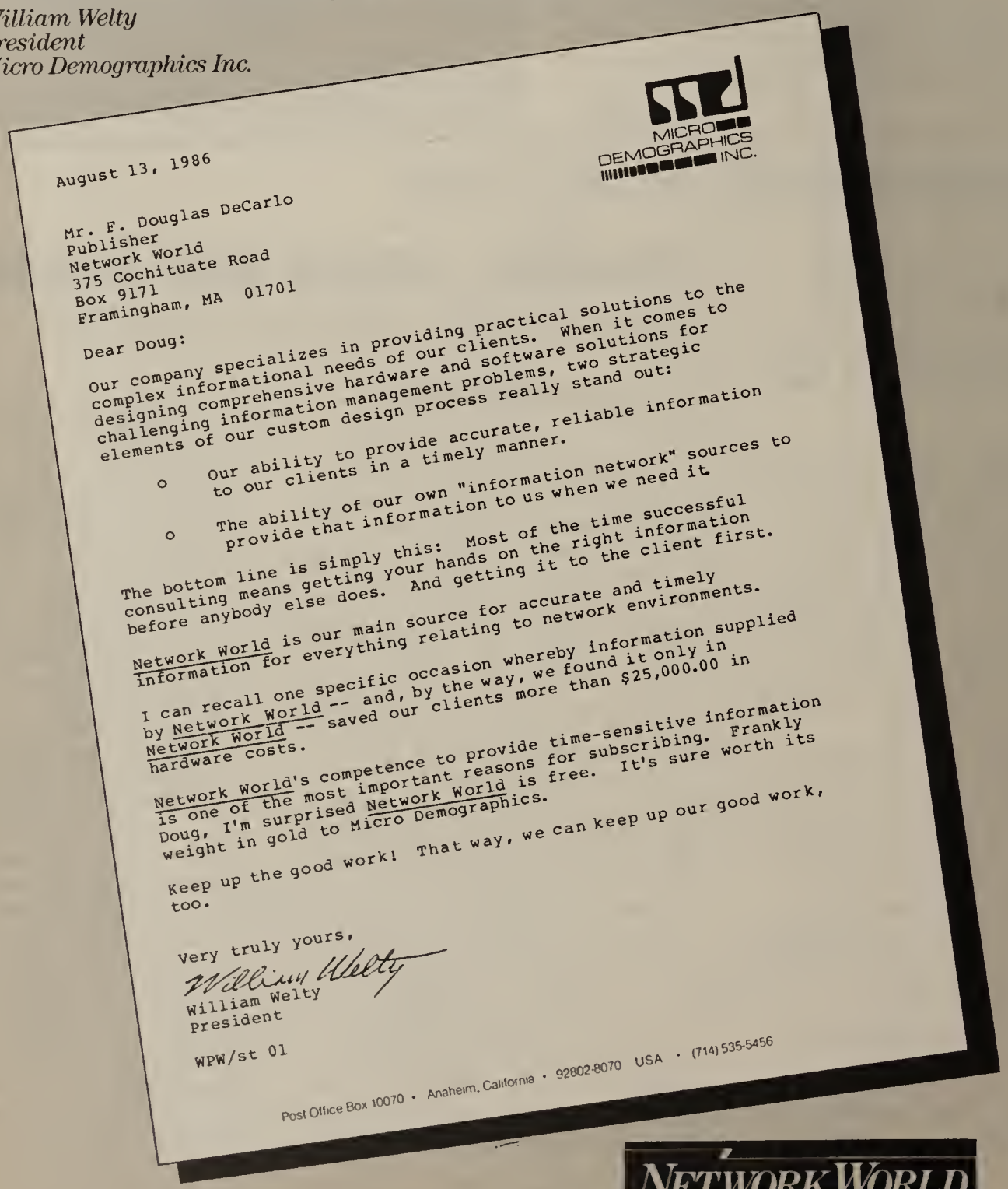
The Token Ring Analzyer, which consists of three expansion boards, can capture up to 5,000 packets of data for analysis. The product monitors token-ring circulation time for devices entering or leaving a network. The analyzer monitors the number of times that devices tie into or log off of a network. The product permits manual adjustment of frequency boundaries to test network stability and prints out documents for event logging and notification.

Both products run on any type of IBM Personal Computer and enable a microcomputer to run either network management software or microcomputer applications.

The Token Ring Monitor is priced at $1,200 and the Token Ring Analyzer at $4,900.

"...information supplied by *Network World*—and, by the way we found it only in *Network World*—saved our clients more than $25,000 in hardware costs."

William Welty
President
Micro Demographics Inc.



August 13, 1986

MICRO DEMOGRAPHICS INC.

Mr. F. Douglas DeCarlo
Publisher
Network World
375 Cochituate Road
Box 9171
Framingham, MA 01701

Dear Doug:

Our company specializes in providing practical solutions to the complex informational needs of our clients. When it comes to designing comprehensive hardware and software solutions for challenging information management problems, two strategic elements of our custom design process really stand out:

- Our ability to provide accurate, reliable information to our clients in a timely manner.
- The ability of our own "information network" sources to provide that information to us when we need it.

The bottom line is simply this: Most of the time successful consulting means getting your hands on the right information before anybody else does. And getting it to the client first.

Network World is our main source for accurate and timely information for everything relating to network environments.

I can recall one specific occasion whereby information supplied by Network World -- and, by the way, we found it only in Network World -- saved our clients more than $25,000.00 in hardware costs.

Network World's competence to provide time-sensitive information is one of the most important reasons for subscribing. Frankly Doug, I'm surprised Network World is free. It's sure worth its weight in gold to Micro Demographics.

Keep up the good work! That way, we can keep up our good work, too.

Very truly yours,

William Welty

William Welty
President

WPW/st 01

Post Office Box 10070 • Anaheim, California • 92802-8070 USA • (714) 535-5456

NETWORK WORLD

The Weekly for Leading Users of Communications Products & Services

375 Cochituate Road, Box 9171, Framingham, MA 01701-9171

BOSTON: Maureen Sebastian, (617) 879-0700/**NEW YORK:** Joan Daly, (201) 967-1350
WASHINGTON, DC: Bill Burke, (301) 268-6179/**ATLANTA:** Tom Tolbert, (404) 394-7509
LOS ANGELES: David Beardslee, (714) 545-7278/**SAN FRANCISCO:** Chris Clyne, (415) 328-4618
CHICAGO: Fran Jonikaitis, (312) 827-4433

CEC from **page 13**

Analysts generally were not optimistic about CEC's chances. "I deem as shaky any company that bases a large part of its business plan on price," said Gerald F. Mayfield, vice-president at the Stamford, Conn., office of DMW Group, Inc., a consulting firm.

Mayfield said that two items can be used to drive the cost of a product down. The first is volume, and most start-up companies do not have high enough volume to drive prices down.

Second is a revolutionary architecture that significantly cuts down on the number of components a device requires. Multiplexer manufacturers basically get their components from the same sources. These components are based on mature technologies. A number of companies have tried various engineering tricks to cut down on the number of components needed for a T-1 multiplexer. However, this process has not resulted in such a revolutionary architecture.

Another potential problem is that most start-ups have other companies perform their production work. Consequently, it is difficult for a new company to keep production costs down.

Jones outlined few specifics about CEC's future product. He said the multiplexer would be based on a different architecture than competitive offerings and would use custom very large-scale integration components developed by CEC. Jones added that the product would include integrated network management capabilities.

Earlier, Jones worked as a senior engineer at Bytex Corp. and helped to develop the company's line of matrix switches. Since he is the driving force behind CEC, it is expected that the product's design will include a number of matrix switch features.

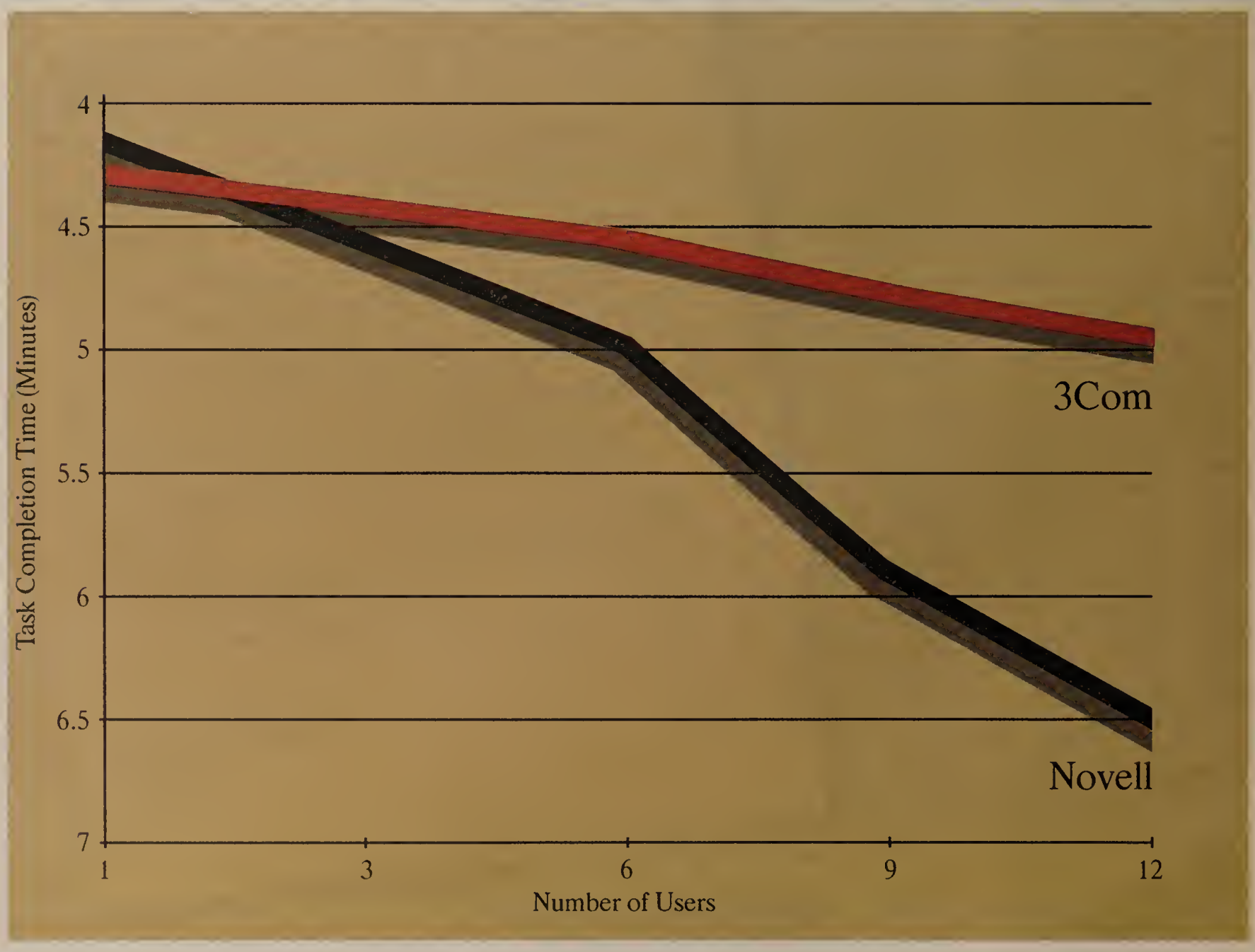
CEC is targeting the high-end T-1 market, which is presently dominated by Network Equipment Technology Co. (NET), Cohesive Network Corp. and Timeplex, Inc. These companies manufacture sophisticated multiplexers that tie a number of T-1 lines into one network and enable a user to allocate lines or channels dynamically. A number of other companies manufacture low-end multiplexers, which are principally used only for point-to-point applications.

Companies like NET and Cohesive were fueled by millions of dollars in venture capital. Jones said that CEC will require only a small amount of venture capital. Currently, employees are funding the company as CEC prepares for its first round of venture capital financing.

CEC has six employees, primarily engineers, who worked at Bytex, AT&T and Wang Laboratories, Inc. Recently, CEC lured Thomas Mercer away from Wang. Mercer was given the responsibility of running CEC's daily operations and making sure that the company brings its product to market. While at Wang, Mercer served as a company director and started a number of business units in Wang's Information Service Corp.

If you thought Novell made the fastest software,

Allow us to bring you up to speed.



Development Environment Test.
3+ Version 1.1 vs. Advanced Netware 286 Version 2.0A on PC/ATs
with 3 megabytes memory, internal hard disk.

Choosing your PC network on hearsay can be a trap. A speed trap.

That's what we found when we compared Novell's Advanced Netware and our 3+ Network Software in benchmark tests developed by an independent lab.*



With the same five users, 3+ ran 6% faster than Advanced Netware on identically configured IBM PC/AT servers. And more than 20% faster with the same 12 users.

Impartial proof that when the work is coming fast and furious, 3Com keeps you fast instead of furious.

For some very good reasons.

3+'s disk caching keeps your frequently used information in RAM rather than on disk, so you can get your data faster.

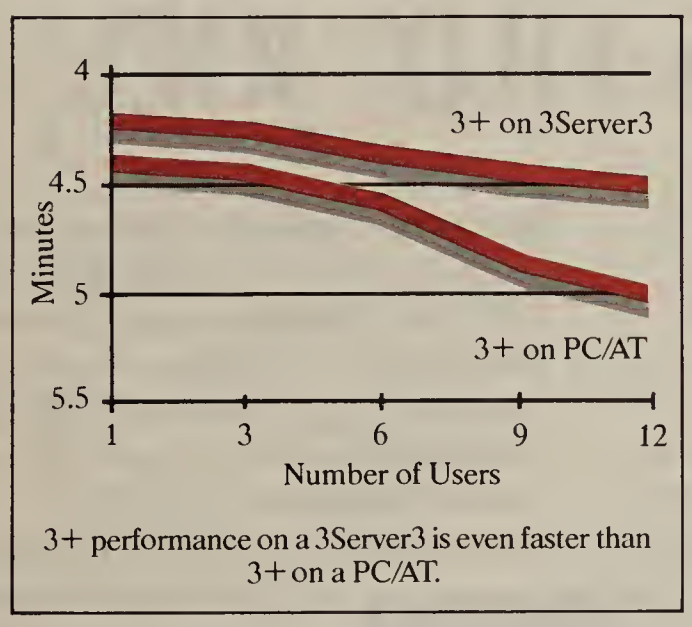
Its directory and file allocation table caching lets you locate your data without a search party.

And 3+'s special elevator seeking algorithm allows your server's drive head to find the closest available data first.

All of which means that a PC/AT with 3+ software is about the fastest combination since grease and lightning.

Even so, an IBM PC/AT was never meant to be a network server.

But our 3Server3 was.



3+ performance on a 3Server3 is even faster than 3+ on a PC/AT.

It's been designed from the ground up to deliver the best price/performance in the industry.

With look-ahead track buffering and SCSI direct memory access that speed data into memory faster than any AT.

Plus a network coprocessor that speeds it back to you.

Best of all, 3Com offers you more than raw performance.

3+'s internetworking also lets you easily connect Ethernet, AppleTalk and Token Ring networks across the hall, or around the world. Even access them from remote PCs. And your 3Com dealer has 3+, 3Server3 and everything else you need to bring your network up to speed. Backed by 3Com's commitment to guarantee your satisfaction.

3Com Authorized Dealer

So call him today. And while you're at it, call us too at 1-800-NET-3Com. We'll send you a copy of our benchmark test results. So you and your network can get moving.

3Com®

*Belmont Laboratories, Belmont, California. ©1986 3Com Corporation. 3Com is a registered trademark and 3+ and 3Server3 are trademarks of 3Com Corporation; Novell and Netware are registered trademarks of Novell, Inc.; IBM and IBM PC/AT are registered trademarks of International Business Machines Corporation; Ethernet is a registered trademark of Xerox Corporation; AppleTalk is a trademark of Apple Computer.

Multiplexers from **page 13**
was the most popular protocol supported with statistical multiplexers. Market Information Center predicted the percentage would increase to 49% within two years.

Users are examining alternative technologies. Only 34% of the respondents said they would not replace statistical multiplexers. Alternatives often mentioned were packet switching, local-area networks, digital private branch exchanges and time division multiplexers.

The time division multiplexer market was divided into three categories.

Micom had more than 22% of the low end of the market, which supported transmission of less than 48K bit/sec. Codex, General DataComm, Dataproducts Corp. and Sperry Corp. rounded out the top five manufacturers.

Racal-Milgo, Inc. dominated the mid-range of the time division multiplexing market (48K to 80K bit/sec). Micom, General DataComm, Astrocom Corp., AT&T and Timeplex each had at least 8% of the market.

T-1 multiplexers are becoming common in medium-size and large corporations: More than 90 sites in the survey had them installed. General DataComm was the leading T-1 manufacturer with 19.8% of the market. Timeplex, AT&T, ITT Corp., Micom and Avanti Communications Corp. followed.

The average number of T-1s currently installed was 6.5, and users said that 10.3 additional units would be installed in the next few years. Currently, these multiplexers are used for data, but users expect to increase voice capabilities of these devices dramatically. Pulse code modulation will be the chosen method using voice with these devices.

The principal buying consideration for time division multiplexers was network management and control, followed by diagnostic control of tail circuits and user reconfiguration control. Access to public switched networks was ranked as the least important consideration.

The study is available for $2,500. Contact Market Research Center, Inc. at (617) 460-0880.

You needn't know everything about X.25 networking.

That's our job.

What you *do* need to know is that Dynapac Systems' PSX™ family of switches offers a Total X.25/X.75 Network Solution. That's because packet-switching is our business... our *only* business.

With eleven different packet switches we give you the capability to build your own network. Or, with unmatched packet-switching expertise, we'll design and operate a network for you. Either way, Dynapac Systems offers today's most comprehensive list of packet-switching features:

X.25 1984 support—up to 1000 packets per second and 6000 virtual circuits;
X.75 capabilities—guaranteed compatibility with all administrations; **State-of-art routing**—preferred alternate routing and load sharing/balancing;
Network control—distributed within any switching node or as a standalone system;
PAD integration—extends network management and control to include all components of the sub-network; **Call detail recording**—reflects all network usage for customer/department reporting;
Call security—beyond CCITT, will support six security levels at both entry and exit nodes.

And with full service support and project management, Dynapac Systems provides the one correct solution you need.



Enlightened Routes to Total Network Solutions.

DYNAPAC® SYSTEMS
A DYNATECH COMPANY

5350 Shawnee Road, Alexandria, VA 22312, (703) 658-2800 Telex: 197539

Coexistence from **page 13**
The OSI Marketing Center at La Gaude provides OSI planning services to IBM customers and even includes an OSI protocol verification service that will enable anyone, including competitors, to test their products for OSI compatibility. IBM is also a member of the Corporation for Open Systems and has established links with OSI research and academic organizations through its European Networking Center in Heidelburg, West Germany.

IBM has already demonstrated that it can incorporate OSI-based technologies into its products. IBM took a first step toward supporting OSI standards in the early days of SNA.

At that time, the company enhanced SNA so it could support an X.25 interface. Customers can use the X.25 interface to replace SNA's Synchronous Data Link Control protocol. This support is now available in virtually every IBM communications product.

A more significant step was recently taken with the announcement of two software packages that run on IBM mainframes. The Open Systems Network Support (OSNS) and the Open Systems Transport and Session Support (OTSS) work with IBM's Network Packet-Switched Interface (NPSI), which provides X.25 support at Layers 1 to 3 of the OSI model.

OSNS runs as a Vtam application and completes the OSI network layer (Layer 3) functions of NPSI. The OSI Transport and Session Layer protocols (Layers 4 and 5) are implemented by the OTSS product. Through these products, IBM has implemented five of the OSI reference model layers. These layers would be roughly equivalent to SNA's Data Link Control through Data Flow Control layers.

IBM has implemented basic OSI communications protocols on a mainframe that can be used to support OSI applications. For example, IBM would have to add software that supports the higher level protocols defined by the CCITT X.400 standard to build an OSI electronic mail package.

What's ahead for IBM in the OSI standards arena? With NPSI, OSNS and OTSS, IBM has constructed an OSI base on the mainframe end of the network.

In other areas, such as general MIS applications, SNA-based technology will dominate for the near term. This situation raises an important issue for managers designing a large-scale network. How can they devise an integrated network solution in a multivendor environment dominated by IBM?

To help answer this question, IBM will have to offer other OSI products. OSI support for products like IBM's System/36 and System/38 is expected. Another missing piece is a gateway between IBM's SNA and OSI products.

For the network models to coexist, users need a seamless connection between the IBM and OSI worlds. The time frame for development of these products is unclear. But it seems that IBM plans to offer them.

TELECOM TRENDS

AT&T's largest switch installed in Taiwan

AT&T recently installed a 5ESS central office switch for Taiwan-based AT&T Taiwan Telecommunications Co., Ltd., a joint venture. The 20,000-line switch is the largest digital switch AT&T has installed internationally. AT&T has shipped 12.5 million lines of the 5ESS, of which seven million lines are in service.

MULTIDROP LINES

Rate element zaps retailer

BY JOHN DIX
Senior Editor

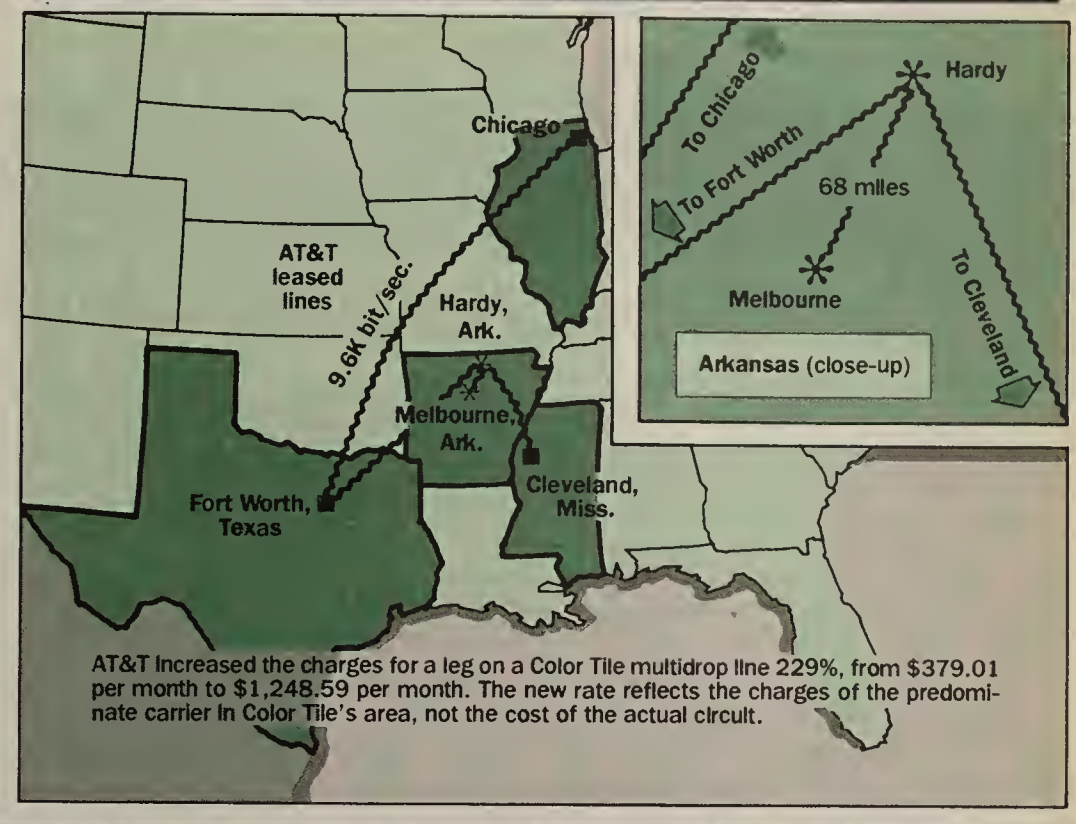
FORT WORTH, Texas — A manufacturer here was recently stung by a 229% AT&T multidrop line rate increase that brings to light a tariff practice that may be costing large users heavily.

In August, the manufacturing division of Color Tile Supermart, Inc., a large chain of retail home improvement stores, found that AT&T had raised the rate for one leg of its three-site multidrop line from $379.01 per month to $1,248.59 per month.

After weeks of digging, Color Tile's data processing manager James Low discovered that AT&T was not, as it had first asserted, simply passing on rate increases from the local phone company that provided that leg of the circuit. AT&T had recalculated the cost of that line using the rates of the predominate local carrier in the region, disregarding the rates of the actual circuit provider.

See **Stung** page 20

Color Tile stung by tariff clause



AT&T increased the charges for a leg on a Color Tile multidrop line 229%, from $379.01 per month to $1,248.59 per month. The new rate reflects the charges of the predominate carrier in Color Tile's area, not the cost of the actual circuit.

CROSS TALK
JOHN DIX

Tax bill spurs rental plan

Northern Telecom, Inc.'s Telecommunications Facility Management (TFM) program could, in conjunction with tax reform, fundamentally change the way switches are procured today.

Under the TFM plan, distributors and other companies will buy switching equipment from Northern Telecom to provide to end users in a rental package that will include maintenance and management service.

Although the full-service aspect of TFM may not appeal to many users, the built-in rental provision may attract even large accounts, particularly users with Centrex today. To ensure broad appeal, TFM providers will probably offer packages that range from mere switch rental arrangements to full facilities management.

The underlying assumption is that customers will be less inclined to buy equipment when the new tax bill becomes law. That bill does away with investment tax credits. Those gone, many customers will rethink the wisdom of tying up capital in phone systems and seek alternatives.

But the revised tax law will even change the alternatives. The leasing business, once the switch financing method of choice and still the major alternative to buying equipment, is built on investment tax credits and depreciation. Both tax components will change under the new bill. Although the ramifications are unclear, the lease alternative may become unattractive.

Even if the leasing business survives unscathed, a TFM rental agreement may be more attractive to some users because it would not require large down payments or heavy lease termination penalties.

Yet TFM will be swayed by the same tax credit and depreciation considerations as the other methods of switch procurement. Without tax loopholes to lower the cost of buying equipment to rent, TFM suppliers may have to make their money by adding value to the rental package in the form of maintenance, support and management.

In fact, if adding value is the only way TFM suppliers can make money, their usefulness to some companies may be limited. Corporations that have their own facilities management infrastructure in place are often addicted to the control they wield.

Centrex users, however, would be perfect TFM targets. Northern Telecom even talks about TFM as being the modern day equivalent of Customer Unit Centrex, an older service that was provided by installing a switch element at the customer's site.

Although TFM is the brainchild of Northern Telecom, if the program meets with success, all the top vendors will follow suit. Because of the threat to Centrex, look for the divested Bell operating companies and independent telephone companies to become interested in TFM. This interest will be accelerated by the market entrance of other large companies. According to an industry insider, Electronic Data Systems Corp. is working with Northern Telecom on the TFM program.

FIBER OPTICS

NET starts upgrade

Fifty Boston buildings slated.

BY PAUL KORZENIOWSKI
Senior Editor

BOSTON — New England Telephone has launched a three-year, $3 billion plan to upgrade its network that will include the installation of fiber-optic local loop facilities in the heart of this historic city.

The fiber-optic part of the New England Telephone plan involves installation of light-wave facilities in a 50-building area in the financial district here. The area is populated by high-rise office buildings that serve as headquarters for such corporate giants as Sheraton Corp., Shawmut Corp. and Bank of Boston Corp.

Installation of the new cable, the company's first commercial fiber local loop, will begin next month and should be completed next year. New England Telephone has other fiber facilities it uses internally.

The new fiber cable will be used in conjunction with existing cable and will enable the company to support new services, such as T-3 facilities, according to a New England Telephone spokesman. T-3 is a 45M bit/sec digital transmission service that offers 28 times more capacity than 1.54M bit/sec T-1 services.

Once construction is completed here, New England Telephone plans to add other fiber networks in rapidly growing business areas. A second network is also planned for Boston.

The fiber cable is part of a $3 billion project New England Telephone has undertaken to modernize its facilities. The company plans to spend $797 million this year alone, the spokesman said. In addition to laying fiber cable, copper facilities will be installed in locations throughout New England.

As part of the project, four AT&T 5ESS digital switches will be added to the company's network. The first is scheduled to be installed at International Place in Boston by the end of the year. Next year, the company will install new modules at its Congress St. location here and Boston Marine Industrial Park. Another will be installed in the Charlestown Navy Yard in Charlestown, Mass., in 1988.

Stung from **page 19**

According to an AT&T spokesman, this practice is condoned by the Federal Communications Commission to simplify intra-phone company billing. In monthly settlement proceedings, carriers divide revenue according to which local and long-haul facilities were used.

In Color Tile's case, the simplification has more than tripled the cost of a circuit component. That line links Color Tile's headquarters in Forth Worth to manufacturing facilities in Melbourne, Ark., and Cleveland, Miss., and has its hub in Hardy, Ark. (see map). The division also has a point-to-point circuit linking Fort Worth to Chicago.

AT&T has end-to-end responsibility for both lines and acts as Color Tile's agent when contracting for the local telephone company links needed to complete the circuits.

The rate upheaval involves a 68-mile link provided by Century Telephone through AT&T that ties Color Tile's Melbourne facility to the multidrop hub in Hardy.

When the rate for that circuit jumped from $379 to $1,248 per month, AT&T assured Low that it was simply because the local carrier had raised its rates. Century, however, told Low it only charged AT&T $148.22 per month.

Confronted with that fact, AT&T responded in a letter offering this explanation: "We passed through to you the charges passed to us by the local serving company. However, as we discovered, in your case the rates we use are from GTE, the predominant carrier in the 528 local access and transport area. While Century is actually your provider of local service, GTE charges are much higher than Century's — $14.82 versus $1.70 per mile." The letter went on to explain that, as a provider of end-to-end services, AT&T is allowed to apply a service adjustment factor of 1.101 above and beyond the local company's rates to recover costs of coordinating carriers.

"I'm not opposed to the 1.101 adjustment," Low said. "I am opposed to AT&T being adamant about its initial claim that it was just passing on charges."

While it is possible that other users could be stung by similar AT&T billing discoveries, it is more likely that customers are already paying for tributary circuits at predominant carrier rates while less expensive facilities are available from small regionals.

According to AT&T, only 2% of its private lines are charged at rates different from those of the actual circuit provider. The AT&T spokesman said this can swing for or against the customer. If Low's Century circuit, for example, had been more expensive than comparable GTE facilities, Low would have benefited from the GTE rates because it is the predominate carrier in that Lata.

Although AT&T goes through monthly settlements with carriers like Century, the money that changes hands is in lump sums. Trying to accommodate all local company tariffs would, in AT&T's own words, create an accounting nightmare.

Low has one recourse. He can opt for coordinated service whereby AT&T would act as Low's agent and order the service from Century. Century would bill Color Tile instead of AT&T, and Low would lose the end-to-end circuit responsibility AT&T shoulders today.

"We may have to take AT&T up on coordinated service, but I don't want to because the Melbourne facility has been the most problem prone," Low said. Because he only maintains two lines, he does not have the test and management resources available to troubleshoot circuits.

Low said he was unable to locate another carrier for the multidrop line but will replace the point-to-point AT&T circuit to Chicago with a line provided by LDX Net, a new fiber-optic carrier.





Even before Sperry and its Uniscope tied the knot with Burroughs Poll/Select, they were talking serious synchronous to each other with a little help from Protocom. From terminals and cluster controllers to front-end processors and hosts.

Which is not surprising. When it comes to establishing meaningful relationships, no one does it better than we do. Especially when it comes to marrying mixed protocols.

By combining the advantages of synchronous X.25 packet-switching with our advanced PAD architecture, we can help most any network perform faster and more flexibly than if all its hardware used the same protocol and were hard-wired together.

We accommodate different types of terminals on the network simultaneously. Give them selective inter-operability. And provide true end-to-end error correction plus automatic system session recovery. All, with multiple security levels, for maximum data protection.

But we don't stop there. Our exclusive TurboMode™ provides the fastest response time of any synchronous PAD. And our unique Dual-Sessions™ capabilities allow any terminal to toggle back-and-forth between two hosts or applications, for maximum versatility.

Little wonder we've become the fastest-growing PAD manufacturer in the country (if not the world). The first multi-protocol PAD certified for use by the U.S. Department of Defense Communications Agency. The PAD selected for NASA by one of the country's largest aerospace manufacturers. The first PAD chosen for an integrated, inter-agency state network. And the first PAD supporting coast-to-coast ATMs.

If you'd like to build a network that meets your needs without compromising your expectations, give us a call. Whether you want to wed IBM with Honeywell, NCR with Control Data, Burroughs with Sperry—or just keep things running smoothly all in one family. We have the technology, the creativity and the support to help you live happily ever after.

ProtocomDevices

You'll be hearing more from us.

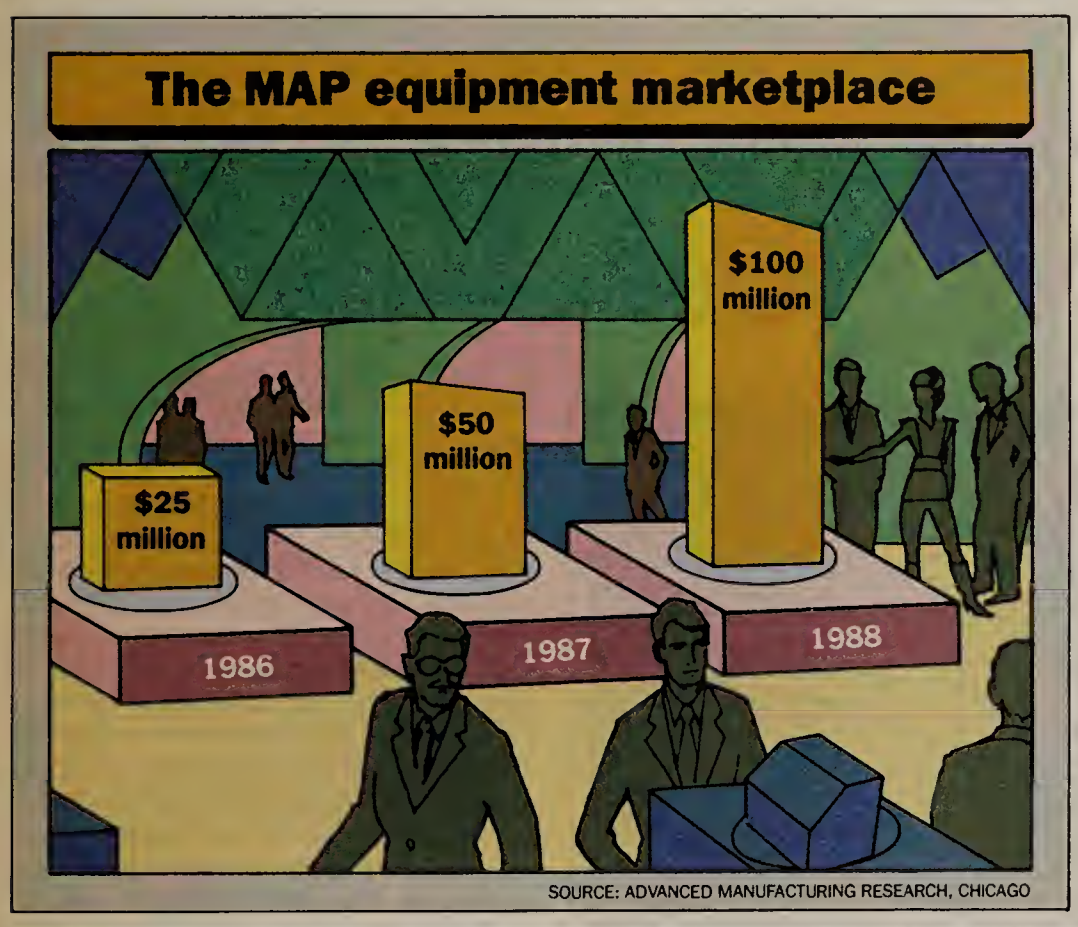
1666 Bathgate Avenue, Bronx, NY 10457 (212) 716-5400, Ext. 515

©1986, ProtocomDevices, Inc. The following are trademarks of their respective corporations: IBM,™ International Business Machines Corp.; UNISCOPE,™ Sperry Corporation.

FACTORY COMMUNICATIONS

TRW joins Chipcom

Chipcom Corp., a manufacturer of broadband Ethernet data communications components, signed a pact with TRW's Information Networks Division. The latter will act as an OEM for Chipcom's full Ethermodem product line. The Ethermodem products enable users to operate Ethernet-type networks over broadband coaxial cable.



SOURCE: ADVANCED MANUFACTURING RESEARCH, CHICAGO

MANUFACTURING NETS

Litton girds to wage MAP war

Firm makes two-pronged assault.

BY BOB WALLACE
Senior Writer

WAYNESBORO, Pa. — Despite the fact that Litton Industrial Automation Systems' Landis Tool Company Division manufactures equipment that will be hooked to advanced factory floor networks, its plant here uses only limited, proprietary factory networks.

The company, which produces grinding equipment used to shape automobile parts, is waging a two-front war. On one front, the firm's networking staff is battling to expand the reach of automation on the factory floor by installing additional manufacturing nets in a facility built in the 19th century.

On the second front, Landis Tool officials are interrogating vendors that have promised to deliver Manufacturing Automation Protocol-compatible gear to determine what

See **Landis** page 22

INCIDENTALS

Industrial Networking, Inc., (INI) a Manufacturing Automation Protocol local-area network vendor, has announced a series of MAP Solutions Seminars. Each meeting will feature a pair of speakers from the manufacturing industry. Ron Keil, manager of communications and control systems engineering at Chevrolet Pontiac Canada Group of General Motors Corp., and Bob Yee, principal applications engineer of technical and industrial control systems at Ford Motor Co., will speak at the second such seminar, to be held Oct. 28 in Detroit. For additional information on the events, contact INI at (408) 496-0969.

The Society of Manufacturing Engineers (SME) announced a seminar entitled "Selection and Use of a Computerized Maintenance Management System," to be held Nov. 28 to 30 at the Amfac Hotel in Los Angeles. Terry Wireman, a consultant and trainer involved in the maintenance field who has also authored a book on this topic, will be the workshop instructor. For additional information on the event, contact SME at (313) 271-0039.

Readers in the market for an artificial intelligence newsletter should contact Texas Instruments, Inc.'s Data Systems Group in Austin, Texas at (512) 250-6314. *AI Artificial Intelligence Letter* discusses how artificial intelligence is being used in manufacturing and other applications. The newsletter also lists upcoming conferences in the field of artificial intelligence.

SME's Machine Vision Association announced a three-day seminar entitled "Vision Guidance for Robotic Systems: Issues and Applications" to be held Oct. 28 to 30. Paul Hampton, president of a consulting firm that assists users in evaluating machine vision and robot applications, will chair the program. For more information, call (313) 271-1500, ext. 399.

Hewlett-Packard Co. unwrapped a ruggedized industrial terminal reportedly designed for use by personnel with little or no experience operating computers. The HP 9666A features a 12-in. color display and a touchscreen that can be used for alphanumeric and graphics applications. The touchscreen feature can be used for on/off and start/stop applications as well as for complex tasks such as real-time display and control of production processes.

FACTORY FACTS

GEORGE T. KOSHY AND ANUPAM SACHDEV

Top-down planning for factory automation

First of a two-part series.

Decreasing computer costs and the growing desire for productivity improvements have increased the pervasiveness of computers throughout the manufacturing world. However, inefficient communications among a variety of automation devices acquired from different vendors results in reduced productivity gains and an inability to satisfy user needs.

The communications problem is compounded by a bewildering array of technologies that are available for network implementation. Many organizations have recognized the fact that the key to an effective automation strategy is a well-thought-out communications system. But these users' efforts to acquire a network that meets the needs of the entire organization are hindered by the lack of a well-defined network acquisition approach.

The Network Life Cycle provides a structured approach for the planning, acquisition, implementation and operation of a manufacturing network. It integrates external trends in the industry with the organization's needs and the network planning process.

Network Life Cycle is a top-down approach to network planning. In many organizations, factory networks have grown from the bottom up. Individual users or groups of users purchase systems to perform specific tasks. But users soon realize that in order to be fully effective, their system needs to exchange information with other users. The Network Life Cycle approach begins by understanding the environment within which both the organization and networks operate and the anticipated communications that, in turn, should define the appropriate network architecture.

In addition, the entire factory networking industry is in a state of constant evolution. The rapid change of underlying technologies and the need to connect devices produced by different vendors to a single network is providing the impetus for defining standards. This changing environment and the lack of standards makes factory net planning difficult.

The planning process cannot take place in a vacuum. The evolving external environment must be reconciled with internal needs by the development of a set of network evaluation criteria. These citeria might need to be reviewed and updated during the planning cycle in response to changes and new developments in the factory networking industry.

Next week, Koshy and Sachdev will delineate the specific steps involved in the design, implementation and operation of a factory network.

Koshy and Sachdev are associates with Booz, Allen & Hamilton, Inc. in Lexington, Mass.

Landis from **page 21**
devices can be used to link the grinding equipment to MAP backbone nets and when they will become available.

Carlin Morris, a networking specialist with Landis Tool, explained that another giant company, construction machinery manufacturer Caterpillar Co., ignores bids on machinery that cannot be linked to broadband, MAP-compatible, coaxial cable-based factory nets. This user company has strained to advance the MAP effort by demanding that the equipment it purchases implement the factory communications standard.

"Caterpillar has already written into its product specifications that products mentioned in vendor bids must be compatible with MAP," Morris said. "It also requests that products be certified MAP-compatible by the Industrial Technology Institute [ITI]." ITI is an independent network testing organization located in Ann Arbor, Mich.

"Practically every request for proposal we receive says the machine must be able to be connected to [Gould, Inc.'s] Modbus, [Allen-Bradley-Co.'s] Data Highway or MAP-compatible local-area networks," Morris noted.

> *"Morris has embarked upon a project to replace the twisted-pair wire in the factory with fiber-optic cable, an effort he claimed will cut media costs by 35% to 50%."*

Landis Tool currently offers a communications network interface device that enables factory networkers to connect the manufacturer's grinding machines to various local-area networks.

Morris said the company has already begun its search for cards that, when installed in the communications interface box, will allow machines to be hooked to local nets that adhere to the MAP specification. "We are shopping for Q-bus MAP controller boards for both carrier-band and broadband networks. A lot of companies have promised these products but they haven't delivered them yet," Morris explained.

The list of networking vendors Morris has spoken with includes Industrial Networking, Inc., Digital Equipment Corp., Computrol, Inc., Motorola, Inc., Hewlett-Packard Co. and Honeywell, Inc.

Unlike the manufacturing plants of the nation's largest automakers, the Landis Tool plant here does not operate a plantwide, broadband factory communications network. Instead, the company uses both a proprietary local-area network that uses shielded twisted-pair wire and point-to-point fiber-optic links. Each shop floor machine connected to the Modbus local net uses Landis Tool's communications interface device. Data in Ascii format is then sent across the Modbus net to one of the two DEC PDP 11/73s in the building's electronics room.

Morris has embarked upon a project designed to replace twisted-pair wire in this plant's factory floor with fiber-optic cable, an effort he claimed will reduce the site's transmission media costs by 35% to 50%.

"For runs longer than 50 feet, we use fiber-optic cable," he explained. The point-to-point lightwave links, which run an average of 200 feet, hook the company's MTC machine controllers — devices similar to programmable controllers — to the PDP 11/73s, he said.

"Fiber-optic cable is easy to install and is immune to both radio frequency interference and electromagnetic interference," Morris said. The company is considering acquiring either a DEC or an IBM network that would enable factory personnel to download programs from the plant's PDP-11-based and DEC VAX-based computer-aided design systems to the grinding machines.

Users group meetings, automation conferences and machine tool trade shows are "must attends" for Morris. He regularly attends MAP Users Group meetings, annual Autofact conferences and industry-specific shows such as the International Machine Tool show.

"At the MAP Users Group meeting, I look for stories from users who are implementing MAP technology," Morris said. "Users generally tell the truth about the problems they have had with vendors and the pitfalls others should watch out for." He said shows like Autofact, which feature live product demonstrations, are of inestimable value.



The ATDM from Astrocom can multiplex data from up to six synchronous devices on to a single DDS 56K transmission link, CCITT equivalent 64K transmission link, or either of these speeds on private 4-wire 56K or 64K bps lines. It divides the bandwidth among its six channels in any combination of speeds from 2.4 to 19.2K bps.

ATDM set up and operation is extremely simple. The unique LCD command display lets you easily set port speeds, monitor system status and perform network diagnostics — no DIP switches to set. Parameters are downline loaded to remote units. Other features include:

- Eight user selectable speed formats
- Non-volatile RAM storage of parameters
- EIA signal propagation for tail circuits
- Local and remote loopback tests on a per channel basis
- Tabletop or rack-mount packaging
- Available with built-in DSU/CSU or short haul modem
- DSU/CSU, short haul option provides bit error rate display
- 220V/50 Hz available

And, at a price of $1,395, you get a lot of power for the dollar. For more information call us at (612) 227-8651. It's time to make your power move!

astrocom

Delivering solutions in data communications.

120 W. Plato Blvd.,
St. Paul, MN 55107
(612) 227-8651, Telex: 297421

COMMUNICATIONS MANAGER

"Network management is the most important ingredient for networking success. It will be one of the key elements of product differentiation as connectivity becomes standardized.

Judy Estrin
Executive vice-president
Bridge Communications, Inc.

MANAGEMENT

State network chiefs team up

Conference to deal with the specific concerns of state telecom managers.

BY MICHAEL FAHEY
Staff Writer

SEATTLE — Running a multimillion dollar telecommunications operation is a challenging enough task. But state telecommunications directors face unique problems not encountered by their colleagues in the corporate world.

To support one another, state telecommunications professionals in 1978 formed the National Association of State Telecommunications Directors (NASTD). This year, NASTD will hold its 9th annual Conference and Trade Show here Nov. 9 to 13.

According to Kent Drummond, telecommunications analyst for the state of Wyoming, the theme of this year's conference, "Telecommunications Management — Taking Charge," is relevant to every communications manager, but it holds special significance for leaders of state telecommunications agencies.

"At a corporation, once the planning is done, the chief executive can tell the financial officer to put aside the money for the project," Drummond said. "We have to go to our legislatures and convince them that the plan deserves funding."

Drummond, a member of NASTD's board of directors, added that even after plans and funding have been approved, there is usually a long wait before the money actually becomes available.

Another issue of importance to state telecommunications managers, and one that Drummond says also fits with the theme of this year's convention, is the role telecommunications managers play in their states' overall information services operations.

"We'll be asking about what has happened in the different states," Drummond said. "Has telecommunications been absorbed by data processing or vice versa? Is telecommunications a separate office answerable to the governor? If there are changes, we want to know how they came about and whether they were beneficial or detrimental."

NASTD members share ideas and experiences through the organization's quarterly newsletter, "The Gateway," Drummond said. But, he added, the opportunity for face-to-face contact provided by the annual meeting is invaluable.

"I feel more comfortable picking up the phone and calling someone that I've met, rather than just calling a name off a roster," he said.

"You can really learn a lot from your peers." As an example, Drummond cited a state telecommunications director who, when offered a chance to buy his embedded base of phones, was able to consult with a colleague who had recently gone through the same process.

"We share ideas about writing [requests for proposal], what consultants are good to work with and, of course, about how to sell ideas to our legislatures," Drummond said.

Betty Boushey, director of telecommunications for Washington state and director of this year's conference, said the proliferation

See **State** page 27

GUIDELINES
ERIC SCHMALL

Sincere vendors shine in time of need

In the information age, where service is everything, communications managers need to develop a genuine, effective bedside manner.

Communications organizations are made up of a delicate web of hardware, software and transport facilities whose slender threads can be easily severed by a variety of causes. Successful communications managers, recognizing the fragile dependency, not only know how to direct fast restoral processes, but also how to reassure users that the communications staff cares about complete and efficient restoration.

Service is the concern of all organizations. In the competitive arena, rival companies try to convince prospective customers that their services are superior to all others. Some make claims of ubiquitous service centers or repair technicians. Others emphasize their fast repair record.

The trend across all industries is for manufacturers to demonstrate that they value your trade — that their employees care if you need the product fixed. Major decisions involving millions of dollars often hinge on how convincing the vendor is on his promise of prompt, efficient service.

> *"The manager should work with his staff in formulating a precise set of actions."*

Within the corporate structure, the communications manager's future depends not only on how well he can maintain service levels but also on how his users perceive his concern in this area.

The manager, as dependent as he is on common carriers and hardware vendors, should be especially empathetic to his own users. No communications professional has escaped the experience of feeling abused and abandoned by a vendor at some time.

A typical experience might go like this: An outage occurs, and the service department is called.

See **Vendors** page 27

Schmall is network systems manager for an insurance holding company.

PEOPLE

John Patterson was named vice-president and general manager of Midwestern Relay Co., a microwave telecommunications common carrier. He previously served as vice-president of operations and engineering.

Before joining Midwestern Relay, Patterson was communications superintendent for Carolina Power & Light in Raleigh, N.C. He is a member of the Institute of Electrical and Electronics Engineers and of the National Spectrum Managers' Association.

Michael Gutman was named vice-president and general manager of research and development at Apollo Computer, Inc. He was most recently vice-president of product engineering at Apollo.

Adams-Russell Electronics Co., Inc. appointed **Abraham J. Siegel** to its board of directors. Siegel, dean of the Sloan School of Management and a professor of industrial relations at Massachusetts Institute of Technology, is a director of Adams-Russell Co., Inc. and the Whitehead Institute for Biomedical Research.

Charles Kenmore was named vice-president and general manager of shared network services for Comsat Technology Products, Inc., a subsidiary of Comsat Corp. Kenmore most recently served as vice-president of telecommunications for General DataCom, Inc. At Comsat, Kenmore is responsible for development, implementation, staffing and commercialization for Starcom Data Services, an interactive shared data network.

John Demgen was named director of investor relations at Pacific Telesis Group. He most recently served as vice-president for Pactel Infosystems. Demgen succeeds **Michael McGreevy**, who was recently named vice-president, treasurer and chief financial officer of Pacific Bell's Yellow Page subsidiary.

Keiji Endoh was appointed chairman of Ricoh Corp. and Ricoh Electronics. Endoh has held major positions within the company, including general manager of the staff office for the copier division and division manager of domestic marketing. In 1986, he assumed the position of division manager of finance and accounting.

Endoh succeeds **Hasashi Kubo**, an executive managing director of the company. Kubo will return to Japan to head up the Ricoh Electronics, Inc. worldwide sales operation.



SOMETHING BRILLIANT JUST HAPPENED TO DATA TRANSMISSION.

Introducing Public Data Network* from the Bell Atlantic Network Services Group. A startling communications development that's just made other interactive data transmission modes seem all but obsolete.

Packet Switching goes public.

Public Data Network offers the benefits of packet switching—through the telephone network—at speeds up to 9600 bps. By batching data into electronic "packets," Public Data Network is ideal for "bursty" applications like order entry, billing, information processing, credit approval, reservations, ticket sales and claims.

Suddenly, there's a more efficient way to move data.

Our Public Data Network is, without a doubt, the most efficient way to move interactive data. Period. What's more, rates are usage-based—dramatically lower than dedicated line costs.

Introducing automatic protocol conversion.

And because Public Data Network supports X.25 and asynchronous protocols, it's the perfect link between dissimilar data processing equipment. Like office and home computer terminals and multiple data bases. It also opens the door for electronic banking and electronic shopping and a long list of other interactive electronic subscription services.

*Service Mark of Bell Atlantic Corporation.

A host of advanced network solutions.

In addition to Public Data Network, the Bell Atlantic Network Services Group provides an array of customized services to precisely match your communications needs.

From voice circuits to a variety of digital data services including High Capacity Digital Service and fiber-optic-based High Capacity Lightwave Service, we offer full duplex dedicated and switched digital data transmission at speeds ranging from 300 bps to 560 megabits. On a point-to-point or multi-point basis.

We're the customized network services experts.

Without optimized network transmission capabilities, your communications system is handicapped. That's where we come in. By applying our most valuable asset—our network expertise—we can unlock your system's potential, adding value through increased operating efficiency.

Contact your Account Executive, or call toll-free 1 800 843-2255, extension 14.

Bell of Pennsylvania
C&P Telephone
Diamond State Telephone
New Jersey Bell

Bell Atlantic™ Companies

WE MAKE TECHNOLOGY WORK FOR YOU.™ Bell Atlantic™

Bring Your Digital Equipment System Needs to New York

It seems the more products that come on the market, the harder it gets to find the right ones for your Digital Equipment computer.

DEXPO East 86 puts you on the right track for DEC-compatible hardware, software, systems and services, by offering products from 250 leading vendors. Compare for price and performance. See all new technologies for the MicroVAX II*, VAX* 8000 series, and VAXmate PC. Explore thousands of enhancements for every VAX, PDP-11*, and DEC micro.

Conference Provides Management and Technical Solutions

The DEXPO East 86 Conference focuses on leveraging your DEC system for total solutions. Sessions for top executives and technical managers will be led by industry leaders who understand your concerns. Topics include IBM-to-DEC Connectivity; Third-Party Enhancements; VAX Migration; Local Area Networking; PC-to-VAX Integration; Software Strategies and more.

FREE Coupons Save You Hundreds of Dollars

Call toll-free 800-628-8185. We'll send you coupons that can save you hundreds of dollars on new products. You also get a free guide to the latest DEC-compatibles, and money-saving show tickets.

DEXPO East attendees get FREE ADMISSION to the concurrent Microcomputer Graphics Show. Explore the benefits of this fast-moving technology.

DEXPO® East 86

The Eleventh DEC*-Compatible Exposition and Conference

Javits Convention Center
New York, NY
December 17-19, 1986

Call Toll-Free **800-628-8185**
(8:30 a.m. to 5:30 p.m. Eastern time)
In New Jersey (609) 987-9400

Organized by Expoconsul International Inc., 3 Independence Way, Princeton, NJ 08540.

*Registered trademark of Digital Equipment Corp.



Vendors from **page 23**

After what certainly seems like hours of inaction, another call is placed to request a status update. The service department representative responds with nonchalance that the problem is being routinely handled. More time passes; more calls to the vendor and still no apparent action. Finally, the escalation procedure begins, and higher and higher levels of the vendor's management hierarchy are called until someone appears to care enough to produce some results.

Now, during the time that all of this stomach-churning activity took place, someone at the vendor's site could have been feverishly repairing the problem. But the perception from the user's contact with the insensitive service center is going to be one of maddening inaction.

The communications manager can learn to keep his users from suffering anguish by instituting some straightforward procedures.

First of all, he should work with his staff in formulating a precise set of actions, which will be taken to reassure a user that restoral processes are under way.

Depending on the severity of the outage — gauged by the number of users affected, criticality of the user department's activity at the time of the outage and relevant details of the cause — certain user management levels need to be contacted immediately and apprised of the situation.

Updates on the situation need to be regularly initiated by the communications manager, and not the user. The frequency of these status updates needs to be tempered by the extent of the outage and its predicted duration.

Granted, the news in these updates may not be good. Even so, the user will feel some considerable comfort over the fact that the communications department is on the case. The user and communications manager will be united in concern over the resolution of the problem.

Such a method helps everyone over the trauma of the outage. But the healing process should continue from there. The manager owes the user a postoutage report. Several postevent follow-ups may also be appropriate so that the user can feel reassured about the resumption of normal operations. Such feedback can also help the communications department clean up any remaining problems that they were not aware persisted after the event.

A final procedure involves contacting users even when there has been no trouble reported just to see if there are any perceived problems. Once again, this is a reassuring courtesy that can give the user a sense that someone cares about his service.

None of these methods will be of any help to the manager or user if they are not grounded in a sincere desire to provide the user with optimal service levels. It is the manager's role to see that this spirit pervades the methods and procedures outlined to help the user recover from the outage.

State from **page 23**

of postdivestiture services and technologies has made it very important for state telecommunications directors to support one another.

"At this year's conference, we will be stressing the importance of understanding and managing the applications of the new technology," Boushey said. "It's important to keep up with technology. But it is also very important for us to be able to convey the benefits of telecommunications technology to state officials and taxpayers."

NASTD comprises four regional organizations, which meet throughout the year. Drummond and Boushey said that a particular value of the regional meetings is the fact that many of the groups' members deal with the same regional and local telephone companies.

"For example," Drummond said, "we have US West and Mountain Bell as a supplier for the seven-state Rocky Mountain area. If Mountain Bell approaches the [public utility commission] in Utah to introduce a service or rate change, I'll find out about it from my counterpart with the state of Utah. I'll know what to expect after finding out how they handled it."

> *"It's important to keep up with technology. But it is also very important for us to convey the benefits of telecommunications technology to state officials."*



NEC America's 18GHz Digital Microwave Radio is miles ahead of our competition in every way but one — its price.

For example, our systems link your local access network over greater distances than 23GHz radios. By using the economical and uncongested 18GHz narrow band, NEC America's advanced transmission capabilities provide better performance with twice the availability of 23GHz microwave systems.

With our 18GHz radios, a change in the weather won't change what you send. Unlike transmissions over the 23GHz band, your voice, data, and video signals remain unaffected by slight rain or fog.

C&C

And if you compare our radios with other 18GHz transmission systems, you'll find that NEC still takes the lead when it comes to performance, quality, and reliability.

Our Standard Features Leave the Competition Behind

Our digital radios have four independent T-1 lines (96 channels) built right in — there's no need for any external multiplexing equipment. Two analog service channels easily provide for your alarm, supervisory, or order wire requirements.

And we offer several different configurations to choose from, the most compact weighing under 40 pounds with a two-foot parabolic antenna.

Best of all, you get all these standard features at a price that puts the other manufacturers where they belong — in second place. So, don't hold back — get the leader of the pack.

Call Radio Marketing at (703) 698-5540, or write: Radio Marketing, NEC America, Inc., Radio & Transmission Marketing Sales Division, 2740 Prosperity Avenue, Fairfax, VA 22031.

NEC
NEC America, Inc.

Add C.E.U.s to your communications I.Q. at Communication Networks '87

The "In-Depth" tutorials offered at the 1987 Communication Network Conference and Expo are the most comprehensive one-day series in the industry. Register now to sharpen your skills for the challenging year ahead.

The Ninth Annual Communication Networks Conference and Expo will be the biggest ever, featuring over 1,000 exhibit booths, over 300 vendors, and as many as 17,000 of your colleagues. It will be THE communications event of 1987, with more new product introductions than ever before, top-quality speakers, and three must-see exhibit halls filled with voice, data, and telecommunications equipment, services, and software options.

If you're a communications professional, come to CN '87 for an indispensable week of discovery—the latest technological trends, new product innovations, management solutions, and more.

And while you're there, give your career a boost by taking part in the most comprehensive one-day tutorial series in the industry. Attendees qualify for recognized Continuing Education Units and certificate.

You'll find the exact basic or advanced tutorial you need to keep up with today's fast-paced telecom environment.

These once-a-year programs are your opportunity to take a step up on the knowledge ladder. Attending an "In-Depth" tutorial puts you face-to-face with a top telecommunications professional. You'll ask questions pertinent to your company's problems and you'll discover how colleagues at other companies are solving problems similar to yours.

Register now to guarantee enrollment. Don't wait until it's too late!

Introductory and Advanced "In-Depth" Tutorials on Key Data/Voice Telecom Topics

Date: **Monday, February 9, 1987**
Time: **9:30 am–5:30 pm**

Place: **Communication Networks '87**
Washington Convention Center, Washington, D.C.

Choose the tutorial that will profit you the most:

T-1 Open Systems Integration (OSI)—A Technical and Strategic Review

Leader: Harold C. Folts, Executive Director, OMNICOM, Inc.

Enroll in this intensive one-day tutorial for a thorough understanding of the concepts and terminology of OSI, a working knowledge of the OSI architecture, an introduction to the seven layers of OSI protocols, and expert guidance in applying OSI to the evolution of distributed information systems. *Level:* Intermediate.

T-2 ISDN—Status and Developments

Leaders: James G. Herman, Director, and Mary A. Johnston, Senior Consultant, Telecommunications Consulting Group, BBN Communications

In this tutorial you'll learn what ISDN will and won't deliver in the late 1980s, what the emerging ISDN standards will mean for new services and improved network performance, what holes still exist in the standards and trials, how to make smart buying decisions while keeping open your options for ISDN compatibility, and more. *Level:* Intermediate.

T-3 Strategic Planning for Corporate Information Networks

Leader: Dr. Howard Frank, Howard Frank Associates

Attend this tutorial to learn how to relate vendor offerings and technological trends to your organization's needs and requirements, and to develop a framework to plan future services and systems. You'll examine current issues in network integration, why communication departments must function as "mini telcos," and the pros and cons of software defined networks and private dedicated networks. *Level:* Introductory–Intermediate.

T-4 Planning and Designing Networks with the New Technology

Leader: Dr. John M. McQuillan, President, McQuillan Consulting

In this intensive seminar, you'll get acquainted with the key architectural principles used by today's leading network planners. You'll review emerging technologies such as T-1 networks, hybrids, VSATs, gateways between SNA, LANs and X.25, micro-mainframe links, intercompany networks, and more. *Level:* Advanced.

T-5 Building the Network Management and Technical Control Facility

Leader: Gabriel Kasperek, President, Kazcom, Inc.

This one-day course will help you understand the strategic value of network control, explore alternative technologies for managing your network, and discover how to evaluate current technologies for use in your own organization. You'll become familiar with the test equipment you need for successful network control and understand industry trends and future directions. *Level:* Introductory–Intermediate.

T-6 Designing Voice and Data Networks under the New Tariffs

Leader: Robert L. Ellis, President, The ARIES Group Inc.

Take this tutorial to learn the structure of the post-divestiture tariffs, the latest January 1987 changes to these tariffs, how to price interstate private lines, how to configure and price interstate FX services, the new economics involved in configuring data networks, the LATA-pure strategy, and more. *Level:* Intermediate.

T-7 Managing the Telecommunications Resource

Leader: Gerald P. Ryan, President and Founder, Connections Telecommunications Inc.

This one-day course briefs you on how to develop a successful management environment. You'll learn what tools are available to do your job more professionally, how to plan a network management center, how to staff and train the department, and how to prepare and substantiate departmental budgets. *Level:* Intermediate.

T-8 IBM Token-Ring Versus Other LAN Choices

Leader: Dr. Kenneth J. Thurber, President, Architecture Technology Corp.

This tutorial gives you an across-the-board overview of announced products, future plans, compatible products, and IBM's overall strategy with respect to Token-Ring technology. You'll discuss the Token-Ring's relationship to IEEE 802.5 and get an in-depth look at NETBIOS and APPC/LU 6.2 interfaces, and more. *Level:* Intermediate.

T-9 VSAT Technology and Implementation

Leader: Dr. Jerome G. Lucas, President, TeleStrategies Inc.

Learn the basics of applying very small aperture terminal (VSAT) satellite communications to your networking needs. You'll get acquainted with basic application requirements in SNA networking, data broadcasting, PC networking, video broadcasting, and teleconferencing. *Level:* Intermediate.

T-10 IBM's Systems Network Architecture (SNA): A Detailed Road Map

Leader: Daniel Zatyko, President, Zatyko Associates

Enroll in this intensive one-day tutorial to understand the evolution of SNA, and learn fundamental SNA concepts, the seven SNA architectural layers, SNA's physical and logical addressing, strategic SNA products, components of NetView, Token-Ring networks, functionality and capabilities of the LU 6.2/APPC and NETBIOS interfaces, and more. *Level:* Intermediate.

T-11 An Introduction to Data Communications Today

Leader: Gary Audin, President, Delphi Inc.

This course introduces you to the basic concepts, terminology and technology of data communications. You'll learn how various networks operate and how to select them; how best to interconnect computers, terminals, and PCs using different protocols; and what software is necessary to support protocols and network management. *Level:* Introductory.

T-12 Understanding the Communications Regulatory Environment

Leader: Richard E. Wiley, Senior Partner, Wiley, Rein & Fielding

Enroll in this tutorial to learn how telecommunications policy is made and changed, what agencies are active in policy making, how industry segments are affected by current policies, what key issues are now under consideration, and how you can influence future decisions. *Level:* Introductory

Make your first smart move of 1987 now.
Fill out this enrollment form and mail it today.

CN '87

NWW2

YES, enroll me in an all-day "In-Depth" tutorial on Monday, February 9, 1987 at CN '87.
Choose one and indicate tutorial number:

☐ **All-day "In-Depth" Tutorial plus full admission to the three-day Conference and Expo,** including over 65 "short-session" conferences plus exhibits—Mon.–Thurs., Feb. 9–12
"In-Depth" Tutorial No. T-_____ **$695.00**

☐ **All-day "In-Depth" Tutorial**—Mon., Feb. 9 (includes admission to exhibits on Tues.–Thurs., Feb. 10–12. Does not include Tues.–Thurs. conferences)
"In-Depth" Tutorial No. T-_____ **$295.00**

☐ **Please send me more information about CN '87**

Registrations cancelled later than January 30 are subject to a $50.00 service charge. Registrations may be transferred at no charge.
Note: all prices include lunch, coffee breaks and tutorial materials.

Name _____
Title _____
Company _____
Street _____
City _____ State _____ Zip _____
Telephone (_____) _____ Ext: _____
☐ Check enclosed ☐ Bill me ☐ Bill company (P.O. # _____)
☐ American Express ☐ MasterCard ☐ VISA/Bank Americard
Card No. _____ Expiration Date _____
Signature _____

Return registration form to: **CN '87, PO Box 9171, Framingham, MA 01701-9171 Or call TOLL FREE 1-800-225-4698**

NEW PRODUCTS AND SERVICES

See inside for:
- ▶Remote PC expansion board
- ▶Digital facsimile machines

▶ TELEPHONE SYSTEMS

NEC unveils key system

Voice/data device has 96 ports and direct PC connect.



MELVILLE, N.Y. — A 96-port digital key telephone system supporting voice and data functions over a mix of up to 40 outside lines and up to 80 internal telephone station sets was introduced by NEC America, Inc.

The software-controlled Electra Mark II key system consists of three cabinets that support up to 32 ports each. The central 32-port cabinet contains the system control and logic on a 16-bit microprocessor board. A pair of add-on cabinets supporting up to 32 ports each can be directly wired to a central cabinet to bring the system to full capacity. The system can be expanded in increments of four ports with the addition of central office or telephone set line cards.

A user can employ software to configure the number of outside lines, internal telephone sets and telephone set features. Configuration commands are entered from a 16-line telephone set key pad .

The company says the Electra Mark II supports standard key telephone system features including conferencing, speed dialing, call forwarding and messaging. The firm also offers optional add-on microprocessor boards that support PBX-like features such as least-cost routing, call accounting and voice mail integration. The firm also said it expects to release direct dial inward, ear and mouthpiece tie lines, simultaneous voice and data transmission and modem pooling features next year.

NEC also released four new telephone sets designed for the Electra Mark II system. Three of the sets reportedly support plug-in modules that allow for direct connection of a personal computer to the telephone. The module will support data transmission over voice lines, allowing users to create direct dial-up data connections and send data messages to another similarly outfitted telephone set connected to the system.

The sets designed for the system include a six-line set that comes with or without a 2-line LCD display and 16-line devices that come with either a 2- or 7-line LCD display. Each telephone set connected to the system can be configured to support a different class of features and can be equipped for hands-free operation, the firm said. In addition to the four recently released telephone sets, NEC said the system will support its Dterm telephones or any standard 2500-type telephone.

The 2-line display telephone sets support an alphanumeric display that can be programmed to show the number dialed, the number and person who is calling, and the source and time a message was received. The 16-line executive telephone set comes with a 7-line display screen that displays the two lines of calling and message information and five lines of information from a directory supporting 110 listings.

The company offers a direct station selection and busy lamp field (DSS/BLF) add-on console that turns the 6-line display, the 16-line display or the 16-line executive telephone sets into an attendant station. Each DSS/BLF console supports 30 programmable direct station connection keys and three programmable function keys.

The system will be sold through NEC's distribution channel of telephone interconnect companies, telephone companies and Bell operating companies. NEC declined to supply a price for the product.

▶ DATA TRANSMISSION

Two 19.2K data switches out

Sequel also reveals 8-switch network board.

BY JIM BROWN
New Products Editor

RALEIGH, N.C. — Sequel Data Communications, Inc. introduced a pair of asynchronous data switches that connect asynchronous terminals and personal computers to one or more host systems at speeds up to 19.2K bit/sec. The firm also unveiled a network board that links up to eight switches in a network.

The desktop or rack-mountable nine-slot SDC 660 Data Switch chassis supports between six and 60 ports and the 20-slot SDC 6192 Data Switch chassis supports from six to 192 ports. Each chassis uses two slots to support primary logic and power

See **Sequel** page 30

▶ PC-TO-HOST

IBM-to-VAX gateway

SANTA CLARA, Calif. — Ungermann-Bass, Inc. unveiled a gateway that connects up to 32 IBM Personal Computers and compatibles to a Digital Equipment Corp. VAX minicomputer over the firm's Net/One local network.

Ungermann-Bass said its dual board Network Interface Unit Model DMF32 (NIU-DMF32) emulates four of DEC's eight-port DMF32 controllers and plugs directly into a Unibus backplane. Each of the 32 connections supported by the NIU-DMF32 operates at speeds up to 19.2K bit/sec over the Net/One local net. The offering will function under operating systems that support standard DMF32 devices such as Unix and DEC's VAX/VMS and Ultrix.

The company says the NIU-DMF32 could replace four asynchronous terminal servers. Previously, personal computers were connected to a terminal server that was then connected to DEC's DMF32 board. Terminals can be connected to the Net/One local-area network through asynchronous network interface boards and to the VAX through terminal servers.

The NIU-DMF32 architecture is designed around Intel Corp. 80186 and 82586 microprocessors, which reportedly off-load from the VAX all Net/One protocol processing. The NIU-DMF32 connects directly to either an Ethernet transceiver for baseband operation or a broadband modem.

The offering can be configured from either a Net/One Network Management Console or a Net/One Network Control Console. It also reportedly has full modem control signaling on each of the 32 ports. The modem signaling will break a VAX virtual circuit when the connected device logs off the VAX or will automatically log off a device that has been disconnected from the network.

A version of the NIU-DMF32 for baseband Net/One networks lists for $6,495. A version for broadband Net/One networks is priced at $7,995.

Sequel from **page 29**
function boards. Both units also have two additional slots to provide optional redundant logic and power that ensure continuous operation should a primary board fail.

The remaining five slots on the SDC 660 and 16 slots on the SDC 6192 support any mix of either 6- or 12-port line boards, networking boards, 32-port statistical multiplexer boards or callback security boards. Each board, the company says, is outfitted with an Intel Corp. 80186 microprocessor operating at 10 MHz.

Each line board includes two full-duplex modem control signals and an RS-232-C interface. Optional RS-422 and current loop electrical interfaces are available on the 12-port line boards only.

The firm's networking board links up to eight fully configured SDC 6192 Data Switches into a local-area network capable of supporting up to 1,536 ports. Remote switches can be linked by installing a 32-port statistical multiplexer board in the switches at both ends.

Standard switching features controlled by the logic board include password protection along with a data rate and flow control conversion function that allows a computer to communicate at its full speed to a slower peripheral device. The system also supports port contention by either port name, number or calling class and will allow one device to connect to two ports during a single session and then toggle between them.

The board-based security callback feature requires a remote device that calls into the switch and enters a password to break the connection. The callback function will verify the password, locate the telephone number associated with that password in its memory and call the location. The security callback feature supports up to 1,000 passwords and telephone numbers.

The firm says a system manager can configure the switch to disconnect a port, monitor activity on another port or broadcast a message to any or all of the switch's ports. A manager is also able to access system reports by plugging a terminal or printer into the logic board through an RJ 45 connector. Reports include a log of all activity on each switch port, the destination and length of each connection handled by the switch and all connection requests rejected by the switch due to improper password entry. The logic board supports switch configuration stored in its random-access memory or from a downloaded personal computer file.

The SDC 660, packaged with logic and power boards, is priced at $895. The SDC 6192, along with its logic and power boards, lists for $995. A redundant logic and power board set costs $1,190. Line boards are priced at $450 for a six-port version, $900 for a 12-port version, $1,100 for a 12-port version with RS-422 interfaces and $1,300 for a 12-port version with current loop interfaces. A network board lists for $995, and the statistical multiplexer board costs $2,495. The security callback board costs $995.

Products & Services

Airline-oriented product line

Telex Computer Products, Inc. introduced its first self-developed terminals and intelligent workstations designed for the airline industry.

The Telex **Airline Systems Automation Product** series is compatible with Telex's 1000/4000 series of terminal systems. It comprises two display terminals, a communications controller and two expansion boards for the Telex 1280 Intelligent Workstation. The Telex **078-A display station** has a 12-inch display and split-screen capability. The **080-A display station** comes with a 15-inch display and quad screen partitioning. Both terminals come with green or amber monochrome monitors and either a 109-key or a 111-key keyboard layout.

The **070-A control unit** links up to 32 terminals with a host mainframe under either the Airline Link Control protocol, the International Society of Telecommunications Associations' P1024B and P1024C protocols or IBM's 3270 Binary Synchronous Communications/Systems Network Architecture protocols.

The Intel Corp. 8088 microprocessor-based 070-A is compatible with Telex's 1070/1076 controller and multidrops up to 32 connected terminals over a single 5,000-foot coaxial cable. A multihost gateway reportedly supports access from the controller to more than one host.

The expansion boards for the IBM Personal Computer AT-compatible Telex 1280 Intelligent Workstation are called the **Airline Device Feature** (ADF) and **Airline Controller Feature** (ACF). The ADF makes the Telex 1280 work-

How great is the competitive advantage N.E.T. T1 networking provides?

Products & Services

station look like a Telex terminal, allowing a user to attach to Telex's proprietary local-area network and toggle between emulation and disk operating system functions.

The ACF supports direct access for the Telex 1280 to a host as well as allowing the 1280 to act as a controller for Telex terminals.

Pricing

The Telex 078-A display unit is priced at $1,700, and the 080-A is $2,750. The 070-A controller lists for $3,400. The Airline Controller Feature board lists for $1,500, and the Airline Device Feature board costs $1,200.

Telex Computer Products, Inc., 6422 E. 41st St., Tulsa, Okla. 74135 (918) 627-1111.

Expansion board for remote PCs

CXI, Inc. introduced an expansion board that makes a remotely located IBM Personal Computer look like a terminal to an IBM System/34, System/36 or System/38 minicomputer.

The **PCOX/5250 Remote** board makes the personal computer look like an IBM 5251, IBM 5291 or IBM 5294 terminal by emulating IBM 5251 Model 12 or IBM 5294 Control Unit functions.

The board supports concurrent access to up to nine host sessions over a synchronous modem, and it supports file transfer with the **PCOX/5250 File Transfer** package.

The PCOX/5250 Remote package lists for $645, and the PCOX/5250 File Transfer package is priced at $150.

The PCOX/5250 Remote and PCOX/File Transfer offerings' combined cost is $745.

CXI, Inc., 3606 W. Bayshore Road, Palo Alto, Calif. 94303 (415) 424-0700.

Equipment inventory software

Tele-Gem introduced personal computer software designed to maintain information about telecommunications equipment.

The **Gem-Control** package is a series of six independent telecom inventory control programs. The menu-driven programs are designed to inventory the number of private branch exchange/switches, modems, multiplexers/concentrators, personal computers, terminals and workstations in a user's possession. In addition, the software package records such data as date of purchase, model number and special functions.

Pricing for individual packages ranges from $350 to $900.

Tele-Gem, P.O. Box 475413, Garland, Texas 75047 (214) 686-9374.

Pair of digital facsimile machines

Panafax Corp. unveiled a pair of digital facsimile machines, one of which includes a 512K-byte memory buffer for storing pages before printing.

The **UF-600SF** comes standard with a 512K-byte memory capable of storing 30 letter-size documents. An optional 1M-byte memory stores 60 letter-size pages.

The unit also can be programmed to transmit selected sections of a page and can double as a photocopier.

The UF-600SF and its companion **UF-600AT** employ a 16-step half-tone reproduction gray scale feature for reproducing photographs, sketches and other half-tone images.

Both units also offer a white line skip feature that reportedly speeds transmission by purposefully failing to reproduce the white lines of an original.

Compatible with CCITT Group 3, 2 and 1 standards, both units transmit over ordinary telephone lines and automatically adjust speed to compensate for line conditions. At their quickest, the UF-600AT reportedly transmits a page in 17 seconds, and the UF-600SF reportedly transmits a page in 12 seconds.

Both units include a built-in telephone handset for voice contact after transmission.

The units will also autodial up to 100 stored numbers, auto redial busy numbers, dial at user-defined times and print out usage reports that include call duration, dates, times and a self-diagnostic test result.

The SF model will be priced around $3,500, the AT version around $3,200.

Panafax Corp., 10 Melville Park Road, Melville, N.Y. 11747 (516) 420-0055.

So great our customers want to keep it quiet.

Our customer testimonials would be vastly more effective here in this space than our claims about successful private networks.

But our customers don't want their networking successes publicized.

They don't want their competition to know.

So we can't tell you who our customers are in print. But we *can* tell you what they're being so secretive about.

Our IDNX™ transmission resource manager enables our customers to consolidate voice and data traffic over the same network, making for a more manageable, *reliable* communications system. A significant advantage.

T1 private networks based on our IDNX transmission resource management equipment cut communications costs so substantially, payback is generally under a year and return on investment is better than owning blue chip stocks. That makes our customers much more competitive.

But cost savings are only the start. Consider providing new, innovative, competitive communications delivery options—to your company and to your customers. Because with the IDNX system, you will have new tools to create new solutions and improvements that were, until now, simply not economical.

Heady claims, and a number of vendors are making them. Too few can back their claims with success stories. We can. But not in this ad.

Here's what puts N.E.T. customers ahead:

First: *Functionality.* Data. Voice. (Including compression.) Video. The ability to integrate *any* equipment into an intelligent, expandable private network. With more features and capabilities than alternative equipment. Compare.

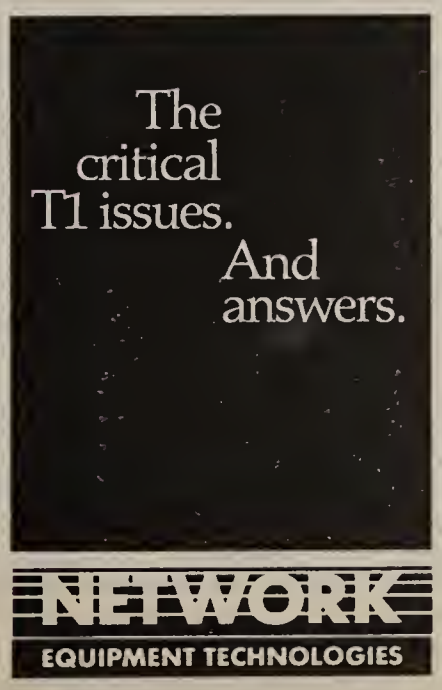
Second: *Compatibility.* With existing communications standards. With the emerging ISDN standards. And with all major T1 common carriers. Again, compare.

Third: Unequalled *reliability.* Our technology, through designed-in, nonstop redundancy and an intelligent, self-healing network architecture means our customers' critical applications have *higher availability*—the true measure of reliability. We invite comparison.

Fourth: Our *service.* Beyond maintenance, a system that can be diagnosed quickly, from your offices or our 24-hour-a-day, seven-day-a-week Technical Assistance Center. Down to the board level on any network node. Service that extends to network design and planning. Service that makes the task of building a private corporate network *practical.* Compare.

Finally: Our *proven* success. With installations all over the U.S., we have solved the thorny problems that are still merely on paper at most of our competitors. By all means, compare.

Call for this free brochure:
1-800-232-5599 Dept. N31
in CA: 1-800-227-5445 Dept. N31



400 Penobscot Drive, Redwood City, CA 94063, 415-366-4400, TLX 171608
Network Equipment Technologies has applied for trademarks for Network Equipment Technologies and IDNX.

Opinions

EQUAL ACCESS

BY ALAN PEARCE

Equal access a thorny issue

Controversy continues to rage over the thorny issue of equal access. Are the Bell operating companies meeting their obligations under the Modified Final Judgment with their proposed equal access schedules? MCI Communications Corp., Satellite Business Systems and some of the other interexchange carriers answer with an emphatic "no." The BOCs, on the other hand, say "yes" and claim that any problems can be satisfactorily explained to U.S. District Court Judge Harold Greene, the U.S. Department of Justice and the competitive interexchange carriers.

At the beginning of 1984 — the time of the breakup of AT&T — there were 111.3 million access lines in the U.S., 80% of which were served by the 22 BOCs.

Although the Modified Final Judgment did not technically define equal access, it did say: "Such connections, at the option of the interexchange carrier, shall deliver traffic with signal quality and characteristics equal to that provided similar AT&T traffic, including equal probability of blocking, based on reasonable traffic estimates supplied by each interexchange carrier."

The magic date for equal access was supposed to be Sept. 1, 1986, but users are still waiting for the much heralded age of long-haul competition in the telecommunications industry.

The features of equal access are the following:

- Dialing parity
- Rotary dial access
- Network control signaling
- Answer supervision
- Automatic calling number identification
- Carrier access code
- Directory services
- Testing and maintenance facilities
- Provision of information necessary to bill customers
- Presubscription

Barry Grossman, chief of the communications and finance section of the Antitrust division of the Justice Department, sent a long letter that illustrates some of the frustrating policies associated with the implementation of equal access to all BOCs. The letter lists nine important questions and orders the BOCs to get their replies back to the Department of Justice by the end of the month.

The following were included in the letter:

- List the number of end offices and the percentages of total end offices converted to equal access as of Sept. 1, 1986.
- List the number of access lines and the percentage of total access lines served by end offices converted to equal access as of Sept. 1.
- Has the BOC met the conversion schedule set forth in its equal access compliance plan filed with the department in 1984? If the conversion schedule has not been completely met, what are the reasons for any deviations, and what are the rescheduled dates for those conversions?
- Have all end offices served by "conforming" switches been converted to equal access as of Sept. 1, and, if not, when will they be converted?
- How many lines and how many end offices are served by "nonconforming" switches, for example, nonstored program control switches or switches that serve fewer than 10,000 lines, the number and percentage of such lines and end offices and the schedule for their conversion to equal access?
- Is equal access for 800-service available, and is it being provided to interexchange carriers from all end offices as of Sept. 1? If not, what is the company's schedule for providing such service?
- Is equal access for 900-service available and being provided to interexchange carriers from all end offices as of Sept. 1? If not, what is the company's schedule for providing such service?
- Is equal access available for public phones and, if not, what is the company's schedule for providing such service?
- Are there any other types of services — as opposed to office services — for which equal access is not being provided? If so, identify such services and describe the company's plans for providing equal access for them.

Tough questions. In addition, the BOCs are ordered to state for each affiliated cellular mobile telephone system whether equal access is available and being provided to interexchange carriers. The Justice Department also wants to know the percentage of cellular customers to whom such access is available.

Clearly, these questions illustrate that the Justice Department, despite recent congressional criticism, is still refereeing the fight among the interexchange carriers for a piece of the $55 billion per year inter-local access

See **Access** page 43

Pearce is president of Information Age Economics, Washington, D.C.

ARTIFICIAL INTELLIGENCE

BY SUSAN K. MAN AND JAMES C. BEISAW

Networks wise up

No major development in computer science has come about without creating strong reverberations in the telecommunications industry. And the new generation of software systems designed to emulate human reasoning — artificial intelligence (AI) — will not be an exception.



Few technological developments since the introduction of integrated circuits have held such revolutionary implications for telecommunications. For example, rapidly progressing knowledge-based expert systems promise to preserve the telephone companies' most volatile and possibly most important asset — thespecialized knowledge and decision-making skills of experienced employees.

A companion development, the natural language understanding system, promises to provide comprehensive, user-friendly computer systems that may be responsive to human speech. These technologies will relieve employees of routine work and also assist them with more complex tasks.

Once this happens, computer programs that allow customers to interact easily with the network will logically follow. This would be useful, for example, when users are reconfiguring their services.

If it fulfills its promise, such technology will save the telephone companies both time and money in addition to improving the diagnosis of network problems in the areas of net design and order and bill processing. In an increasingly competitive telecommunications environment, those who take the lead in developing this technology will hold the advantage.

At Bell Communications Research, Inc. (Bellcore), principal efforts to apply AI have been in building expert systems, particularly those involved in problem diagnosis. Two examples are the Switching Maintenance Analysis and Repair Tool (Smart), an advanced prototype, and the Bellcore Expert Consultation System (Becon), a problem diagnosis and classification tool.

Smart acts as a diagnostic aid for experts who are responsible for troubleshooting the 1A ESS switch, a central office switch widely deployed at the Bell operating companies. The 1A ESS, like other computerized switches, is serviced from the BOCs' Switching Control Centers (SCC) and Electronic Systems Assistance Centers (Esac).

Technicians in the SCC monitor the equipment, receive alarms and solve routine problems. The Esacs handle problems that resist solution by the SCCs. Smart provides computer-based consultation help as an alternative to calling Esac experts.

Becon, a general expert systems tool, is applicable to a broad range of problems such as diagnosing malfunctions in hardware and software, interpreting data and advising repairs.

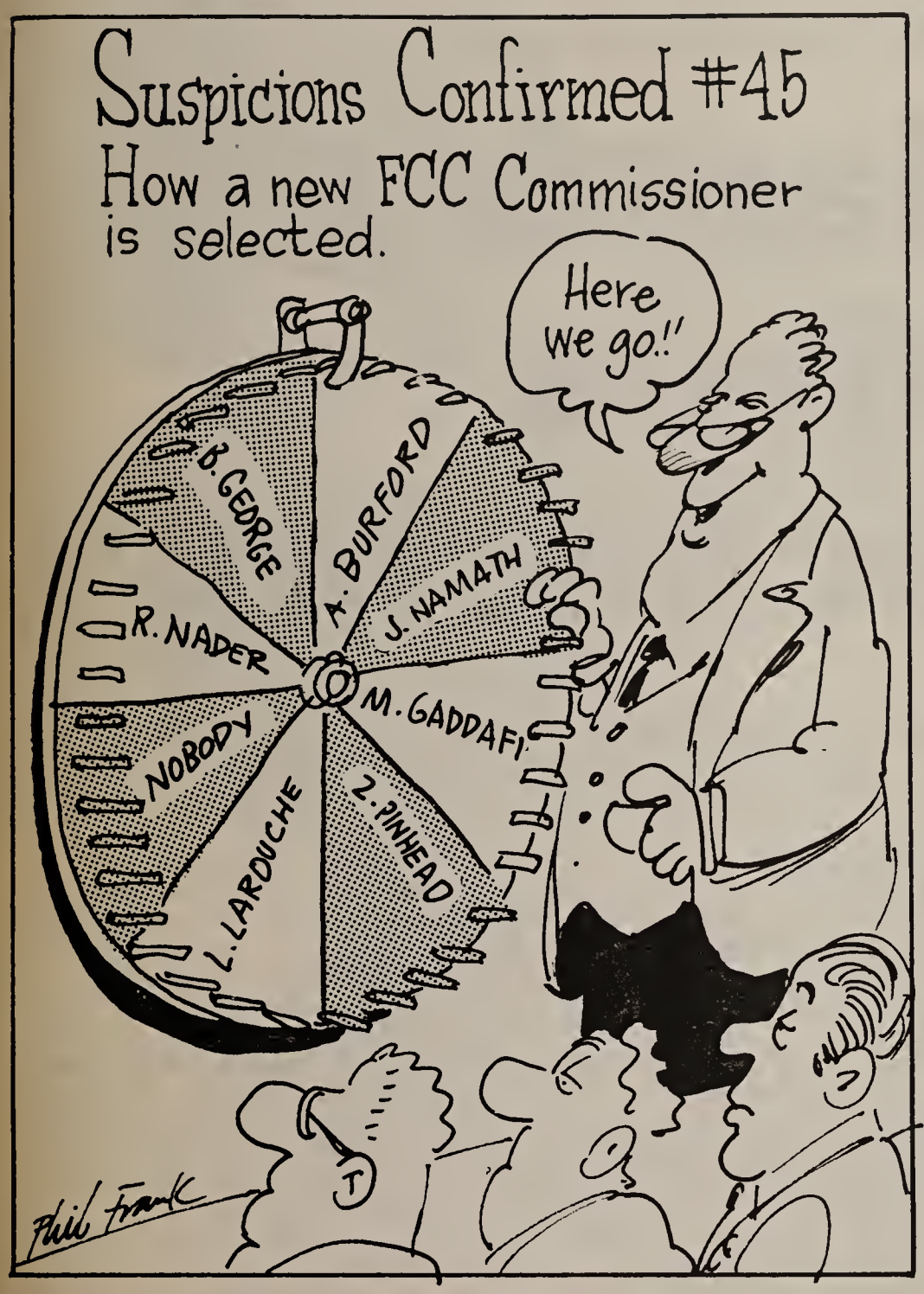
The system has progressed beyond the experimental stage to practical applications. It now provides expert consultation in the installation of both the Unix 1100 operating system and the Sperry 1100 computer into the BOCs' Facility Assignment and Control Systems (Facs) computers. These computer systems comprise an integrated network of component systems that analyze other systems and perform planning and allocation functions.

In the past three years, Bellcore has assisted several BOCs with Facs installations, resulting in a

Man and Beisaw are members of the technical staff at Bell Communications Research in Livingston, N.J

Opinions

▶ TELETOONS — By Phil Frank



heavy demand for trainers and field support staff. The development of Becon made it possible to quickly build a hot-line support system to help alleviate installation problems without involving human experts.

Installed in a Bellcore computer system in Piscataway, N.J., Becon is accessible via remote terminals. In a recent trial at New York Telephone Co., technicians unfamiliar with both the Unix 1100 and the Sperry 1100 successfully brought Facs on line through consultation with a Becon application.

Human expertise emulation

The knowledge that these systems bring to computer systems is derived from human expertise. Herein lies a problem as large as writing the complex programs or designing the powerful computer systems used in AI research.

Experts, called "knowledge engineers," must painstakingly extract information and, more importantly, the decision-making strategies from people who perform system tasks and then teach this knowledge to AI machines.

This truly is knowledge acquisition, and nowhere is there a more exacting application of it than in the building of expert systems.

The essential skill entails drawing out the guidelines that human experts, either consciously or unconsciously, employ in analyzing problems.

These personal bags of tricks are collectively called heuristic knowledge by AI engineers. This term refers to a set of intellectual buoys pointing the way to further inquiry and eventual solution.

Typically, heuristic knowledge is an agglomeration of practical experience, engineering expertise and, in some cases, an internal imaging process that seems to run a mini-simulation of a functioning switch.

Knowledge engineers gather this information in measured doses. They then require a period of assimilation and digestion before incorporating the new gleanings into an evolving problem-solving model.

The engineers must transfer to the AI systems the human experts' understanding of how electronic

See **AI** page 43

NETWORK PLANNING

JOAQUIN GONZALEZ

Set your own strategy

To negotiate successfully with vendors and then deliver bandwidth to corporate users in a way that supports business goals, telecommunications planners need a good understanding of those goals. Unfortunately, most planners are merely reacting to vendor pitches.

Users' wide-area network planners tend to fall into two camps. The first group sees network planning as synonymous with network design. These planners tend to be service-oriented; they use a cost-control approach to manage voice networks, but manage data networks to the fulfillment of applications. By contrast, the second, smaller group sees the corporate telecommunications network as a strategic resource and concentrates on developing a telecommunications framework that supports the goals of the telecom planners' organizations.

While both camps include successful individuals and organizations, developing a network strategy for facilities and switches better enables users to cope with the drastic changes in the post divestiture telecommunications environment. Such a strategy ensures that switches, dedicated facilities and public network services are arranged to meet user needs, rather than the strategic objectives of vendors.

A vendor may try to establish "account control" — a progressive narrowing of user options around the vendor's products and services. The trouble comes when the vendor succeeds in selling a strategy that's not appropriate for the customer's business plans.

The place to start in developing a wide-area network strategy is with the user organization's business plan. For example, the telecom planner should examine the expected rate of change in network topology as a function of corporate development plans. Even without sensitive merger and acquisition information, for instance, a telecom planner can reasonably conclude that a conglomerate that occasionally buys and sells major divisions needs a wide-area network strategy that can accommodate major changes smoothly.

One emerging strategy is to employ the Lata-pure/T-1 gateway architecture, which uses the telephone company for local facilities, and establishes T-1 gateways for connection to interexchange carriers. The local-exchange carriers concentrate all intra-local access and transport area traffic at a single gateway for transit to or from the interexchange carrier on a high-capacity digital pipe.

This topology is independent of choices of local switching technologies, such as private branch exchanges and Centrex. It is also independent of whether voice network routing and management functions are performed on the customer's premises or in carrier switches.

Gartner Group, Inc. has seen Lata-pure strategies that use several combinations of switching technologies and network types. In such networks, the decision on where to place networking intelligence is a significant influence in terms of customer control.

As for data networks, the beauty of the Lata-pure strategy is that it can be economically evolved from existing operations while laying the groundwork for efficient integration of separate data networks at the interpremises facility level. Initially, the modems used at the concentrator, or host end of point-to-point or multidrop inter-Lata networks, can be moved to the T-1 gateway site. The modems at the remote sites stay in place and are used to connect intra-Lata facilities, of the same type and bandwidth that currently exist, to the T-1 gateway.

Different data networks sharing the T-1 facility from the gateway to the interexchange carrier can be assigned separate subchannels derived from the T-1 bandwidth. This effectively maintains the autonomy of the separate data networks, which is often desirable in terms of network operations, organizational politics and user acceptance.

The Lata-pure strategy requires direct interaction with the telephone company. Therefore, an organization contemplating such a network plan should be either regionally concentrated and learn how to do business with a single regional Bell oper-

See **Strategy** page 43

Gonzalez is service director for enterprise networking strategies at the Gartner Group, Inc. in Stamford, Conn.

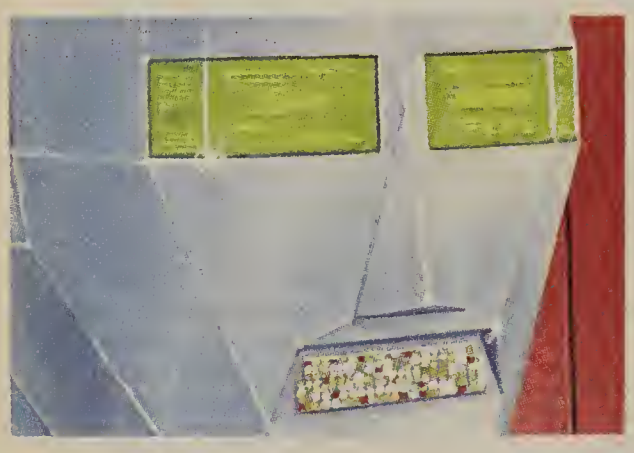
NETWORK WORLD

Features

October 13, 1986

Planning drives technology
Selecting the right local-area network alternative is a tricky process. The wrong network solution can throw your company's network plans — and your career — off-track. An explicit, coordinated planning procedure will help any communications manager meet his goals.
This page.





Who's the guru?
Artificial intelligence conjures images of Dr. Frankenstein's laboratory, but it can be an effective network tool. Management and design of networks are just two of the areas on which expert systems can offer advice. But no matter how beneficial expert systems are, they won't get to strut their stuff unless communications managers make up their minds to use them.
Page one.

Goodbye, paper chase
Users are suffocating in a mountain of paper, and image communications on optical disks is like a breath of fresh air. This growing technology can turn millions of unruly documents into a manageable data base. As the demand for more capabilities arises, image communications might include such exotica as fiber-optic links.
Page 41.

▶PROJECT MANAGEMENT

Planning drives technology

Too often, excessive technical detail derails the network planning process.

BY PHILIP H. REAGAN
Special to Network World

To some communications managers, a local-area network is a dozen or so personal computers strung together on an Ethernet cable.

To others, a local net is a terminal-to-host network in a minicomputer or mainframe environment. But a large group of managers share at least one perception: Selecting the right local-area net alternative is a tricky task.

Many organizations have three major types of computing environments — mainframes, minicomputers and personal computers — all with different applications and communications protocols. Accordingly, it is not unusual to have three or more local-area networks within the same organization.

Today, managers need more than seat-of-the-pants savvy to help them select and coordinate multiple local-area networks in a way that rewards the organization with reduced costs and increased productivity and flexibility.

Poor planning procedures distort more local network decisions than any other single management error. Too often, those involved in the network-planning process become so obsessed with technological details that they pay insufficient attention to the process itself.

Reagan is general manager of the San Francisco-based California Systems Group.

> *"Managers need more than seat-of-the-pants savvy to select and coordinate multiple networks."*

The objective of the network-planning process is to produce a detailed plan that satisfies all network requirements at the lowest possible cost.

Planning ahead

The network-planning process comprises four steps: orientation, or identifying the current network configuration and requirements, researching alternatives, evaluating alternatives and determining a course of action.

These steps can be flow-charted much like a computer program. After the completion of each step, the planning committee goes back and spends additional time with earlier steps in order to sharpen the requirements and improve the quality of the results.

To arrive at the best possible solution, everyone involved in the purchase and use of the local-area network should participate in the decision-making process as members of a planning committee or task force.

Orientation

Once the task force is organized, the first step is to document the current network environment and user requirements.

Start by describing the situation as it currently exists.

Included in the list should be the physical facilities, computers, workstations and applications, users, departmental organization and communications



JOHN KILROY

facilities. Also, document all planned equipment, service or other changes, such as expansions or moves, and include scheduled dates for all changes. Another consideration is traffic.

Examine current volume, message formats, usage patterns, response requirements and other pertinent traffic data. Rough estimates are sufficient for planning.

Finally, gather all available network documentation, including engineering drawings, maps, facility floor plans, equipment lists — even if outdated or incomplete — workstation documents, vendor manuals, strategic plans and bidders' information. Because this material may be provided to outside parties, sensitive materials should be marked as confidential.

After the information has been collected, develop a list of primary questions, such as:

- What is the best way to solve this particular networking problem?
- How should the building be wired?
- What specific networking technology is optimum?
- What will it cost?
- Is it a flexible, long-term solution?
- What are other organizations doing?
- Do we need to act now or should we wait?

List the alternatives

The next step is to build a list of network alternatives, such as data switches, modems used over voice circuits, integrated digital private branch exchanges, broadband local-area nets, baseband local nets and personal computer local-area nets.

Outside experts, including consultants and vendor personnel, should be asked to contribute information about network alternatives. To keep the process manageable, limit the number of device alternatives. Concentrate on the typical, representative devices to be attached to the network; don't waste time worrying about unusual situations.

After a list of all appropriate alternatives has been compiled, a representative product for each should be selected. At this point, it's not important to select the best product. The objective is to provide a starting point for the evaluation.

For some alternatives, it may be necessary to go back to the orientation phase to gather more information. For example, the task force may not know the protocols for one class of terminals.

Evaluation

A committee should use a case study approach and prepare a brief outline that lists cost, feasibility, advantages and disadvantages of each alternative, along with a short list of intangibles.

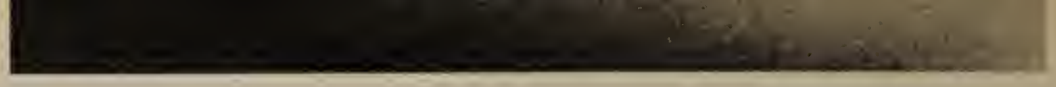
A summary form, which evaluates alternatives by applying a point system to a set of predetermined features, acts as a checklist and helps ensure that all alternatives are evaluated in the same way.

However, it may be difficult to quantify some factors such as vendor support and reliability. Ask the vendor to supply numbers or at least give relative values along with supporting data. Vendors should also put these values into the contract, or at least into their proposals.

Avoid the danger of having the system summary turn into a weighted evaluation matrix, in which matrix categories are assigned a weight determined by their relative importance. Often these look impressive, but their excessive detail tends to obscure some of the most important points.

In doing the evaluations, start with the most likely or most popular solution

Continued on **page 40**



PC World Magazine

Congratulates

The 1986
World Class
Award Winners

Hardware

3Com Corp., *EtherSeries*
AST Research, Inc., *SixPakPlus*
Compaq Computer Corp., *Compaq Portable 286*
Data General Corp., *Data General/One*
Epson America, Inc., *LQ-1500*
Hayes Microcomputer Products, Inc., *Smartmodem 1200*
Hewlett-Packard, *LaserJet Plus*
Hewlett-Packard, *HP 7475A Plotter*
IBM, *IBM PC AT*
IBM, *IBM Enhanced Graphics Adapter*
IBM, *IBM Enhanced Color Display (co-winner)*
Iomega Corp., *Bernoulli Box*
Microsoft Corp., *Microsoft Mouse*
Plus Development Corp., *Hardcard*
Princeton Graphic Systems, *HX-12 (co-winner)*
Seagate, *ST-225*

1986
PC WORLD
WORLD
CLASS
AWARD

Software

American Training International, *Training Power Series*
Ashton-Tate, *dBASE III Plus*
Ashton-Tate, *Framework II*
Autodesk, Inc., *AutoCAD*
Barron's Educational Series, *Study Program for the SAT*
Borland International, Inc., *SideKick*
Borland International, Inc., *Turbo Pascal*
Borland International, Inc., *Turbo Lightning*
ChipSoft, Inc., *TurboTax*
Dac Software, Inc., *Dac-Easy Accounting*
Decision Resources, Inc., *Chart-Master (co-winner)*
Digital Communications Associates, Inc., *IRMA*
Living Videotext, Inc., *ThinkTank*
Lotus Development Corp., *1-2-3*
MECA, *Andrew Tobias' Managing Your Money*
Microsoft Corp., *Microsoft Flight Simulator*
Microsoft Corp., *Microsoft Chart (co-winner)*
Microsoft Corp., *Microsoft Windows*
Microstuf, Inc., *Crosstalk XVI*
Peter Norton Computing, Inc., *Norton Utilities*
Software Publishing Corp., *pfs:file*
Software Publishing Corp., *Harvard Total Project Manager*
WordPerfect Corp., *WordPerfect*

PCW COMMUNICATIONS, INC.
501 Second Street, Suite 600
San Francisco, CA 94107



▶PROJECT MANAGEMENT

Stepping through a project plan

The multiple building facilities at Thorton West, the central engineering and manufacturing facility of an imaginary Midwestern electronics manufacturer, are candidates for a local-area network .

The engineering facilities are being remodeled and a new minicomputer will be installed in a few months. The facilities manager decides to set up a task force to study the situation and recommend a course of action.

A senior engineering analyst is assigned to chair the task force, dubbed the Network Planning Committee. He asks each of the five department heads at Thorton to assign a representative to the committee. The addition of a teleprocessing specialist and facilities engineer completes the group.

Next, each department representative writes a brief description of his department's size, equipment and current use of computing resources. The facilities representative produces a simplified map of the facility and floor plans for each building.

The company employs a total of 4,000 people, operating seven computers and 1,000 terminals and other workstations. The computers and the voice private branch exchange are located on the floor plans.

At the orientation meeting, the group prepares a one-page summary of Thorton's network and puts this information on one foil for display on an overhead projector. Next, the committee creates a list of factors and objectives, including the following:

- More than half the current users of computer services must have access to more than one computer.
- About 45% of the company's 2,500 professionals move with their workstations every year. The committee estimates the cost of moving each workstation at about $1,000.
- The net should be capable of supporting more than 5,000 terminals.
- Connection speeds need to be increased.
- An electronic mail system should be installed.
- Changes must be made without disrupting work.
- A long-term, universal wiring plan is highly desirable.
- Access is needed to outside data base and computing facilities.
- File servers and print servers are requested for users of word processors and personal computers.

The committee ranks the first three list items as very important and the other items as desirable. The majority of workstations are terminals; therefore, the issue of personal computer servers is set aside during the initial phase of the study.

Next, the group makes up a list of possible networking alternatives. For a terminal-based network, the alternatives include direct cable connect with pass through for connection to other computers, modems for use with the phone system, a data switch or a voice/data switch and a baseband or broadband local-area net work.

The facilities engineer suggests modular wiring systems as an option for solving the relocation problem. Finally, committee members are assigned tasks for the next meeting. Each department representative is to develop a complete terminal inventory for his department along with an estimated host access time.

At the next meeting, the alternatives are evaluated with a case study of each, including all costs and relative productivity benefits to be gained.

Again, more information is required along with a study of whether cable routing would be more efficient in the floor or in the ceiling. Three network alternatives are selected for a more detailed evaluation. The vendors are given copies of informal documentation developed by the committee and are asked to provide proposals.

After the proposals have been received and evaluated, the committee makes its recommendation to management. Management has questions but it approves the initial phase of the implementation plan, which includes engineering drawings, a conditional order of network equipment and installation of a small, test bed network. Management also requests a study to select an appropriate personal computer local-area net for the facility. The task force responds by researching management concerns and comparing alternatives. Finally, the plan is approved, and an orientation meeting for a personal computer local net is scheduled.

— Philip H. Reagan

SYNCmodem™ is your SNA or BSC Gateway



Features:
- PC/XT/AT bus compatible
- Auto-dial/auto-answer
- Tone or pulse dial
- Supports Bisync or SDLC links

3 Models:
- 201 (2400 baud)
- 212AT/201 (1200 and 2400 baud)
- 208 (4800 baud)

Description:
SYNCmodem is an IBM PC, XT or AT bus compatible interface card capable of operating as a synchronous modem or as a synchronous interface card.

SYNCmodem is ideal for remote PC-to-mainframe or PC-to-PC communications. It comes fully integrated with 3780Plus™, CLEO-3270 SNA or BSC, and CLEO-5250 SNA software packages.

3780Plus allows fast and efficient file transfers, over common phone lines, between your PC and any micro, mini, or mainframe that supports 2780/3780 Bisync protocol.

CLEO-3270 SNA or BSC and CLEO-5250 SNA allow your PC to emulate a remote 327x or 525x terminal device. All you need is a phone line.

The 212/201 modem includes the Mirror asynchronous software package in addition to your selected CLEO SNA or BSC package.

For details call 1(800)233-CLEO.
In Illinois 1(815)397-8110.

CLEO®
CLEO Software
a division of Phone 1, Inc.
1639 North Alpine Road
Rockford, IL 61107
TELEX 703639

CLEO is a registered trademark of CLEO Software.
SYNCmodem and 3780Plus are trademarks of CLEO Software.

Ever get that long-distance feeling from the folks who manufactured your phone system?

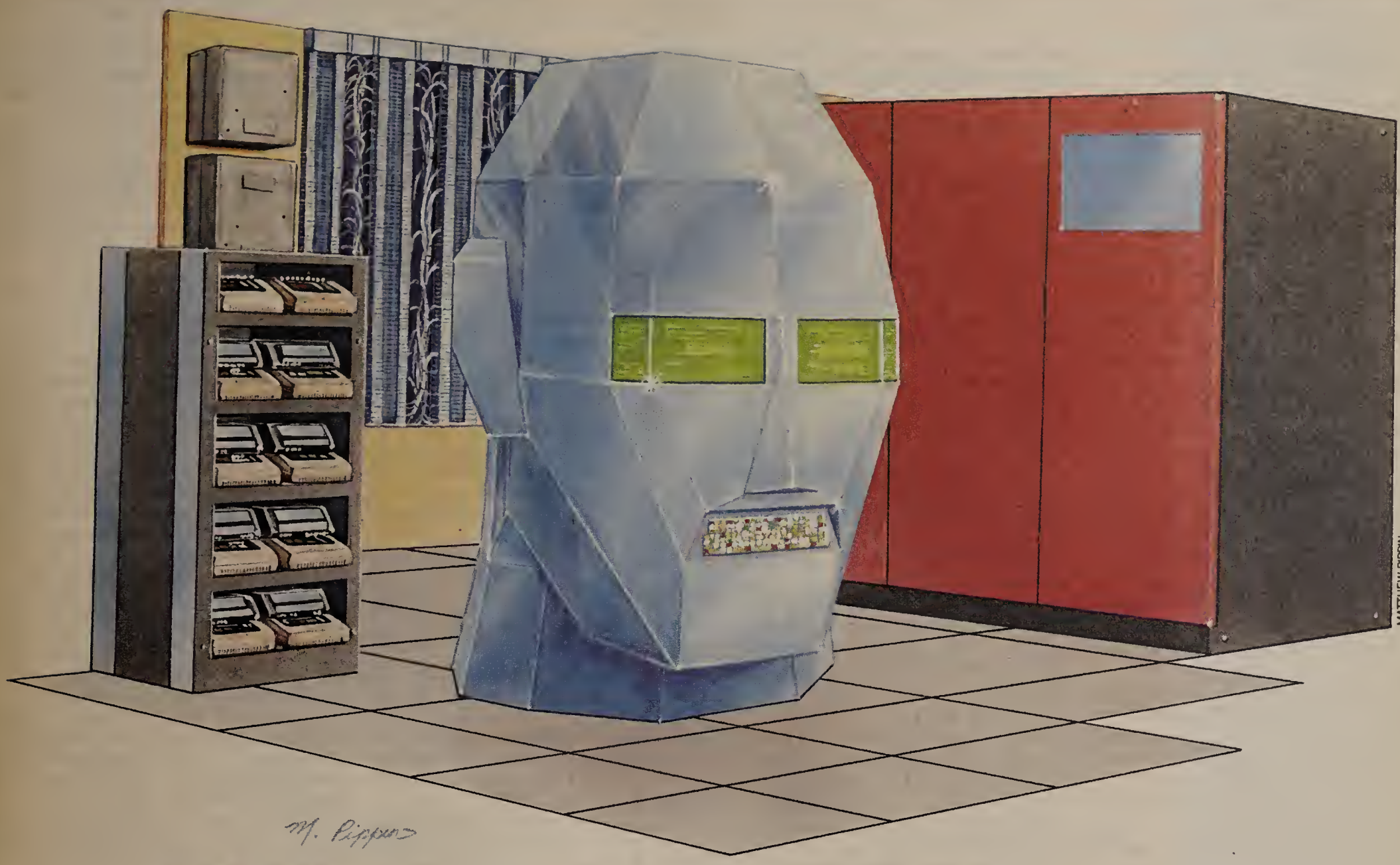


Judging by what's available, you'd think PABX manufacturers lived in a world apart. Of course, you wouldn't think that way if you were among 40,000 owners in the *SX-200*® family. They've been close and comfortable* with Mitel for years. Which leads us to believe you'll be excited about the new *SX-200 DIGITAL* PABX. Reliable, flexible. More future-proof technology in the *SX-200* tradition. And compare this to the competition. We've included a powerful console. Not to mention *Superset*® business phone compatibility. The *SX-200 DIGITAL* PABX. For the no-distance feeling. That, we believe, is the answer you're looking for.

MITEL®

COMMUNICATIONS ANSWERS THAT WORK... FOR YOU.

* To find out how comfortable Mitel customers are, send for a free brochure by calling: in the U.S. 1-800-MITELSX, or in Canada, 1-800-267-6244.



MATTHEW PIPPIN

M. Pippin

Who's the guru?

Continued from page 1

tious AI theories and promises that date back to the drawing board of Dr. Frankenstein.

But for two decades, software that makes recommendations and offers expert advice based on life-like thought processes and rules of thumb has been in use. The software has been emulating, replacing and backing up physicians, wildcatters, diesel mechanics and telephone cable repairmen, to name a few. And the latest specialties to be captured in an expert system are telecommunications network managers and network designers.

Few new expert systems for telecommunications are expected to be on the market over the next two years. Out of the nearly 100 expert systems in use today throughout the sciences, professions and technical trades, only two are in the communications management field. No others are expected to be formally released before at least the end of 1987.

However, the days when expert systems designers could ignore network design and management are over. The reason is simple: During the last few years, the combination of deregulation, divestiture and steady advances in high technology have made designing and managing communications systems nearly unmanageable tasks without a good deal of support and help.



An expert system that integrates a wide array of incoming data, digests it, formulates solutions and opinions on how to design, enhance, troubleshoot or supervise a network and then presents them in a cogent, straightforward and unbiased fashion is suddenly a professional imperative.

"The emergence of expert systems for communications management is a direct result of the fact that networks are now more complicated," says Nat Mills, product manager of the Mount Laurel, N.J.-based Avant-Garde Computing, Inc., a company that makes an expert system called Net/Adviser, which reads information from a network monitor and offers recommendations for solving problems.

"It used to be that a terminal was connected to a host using a cable, and that was it. But networks have now evolved to be extremely complex animals, as have the separate components of networks," he says. "It's impossible for one network manager to retain all of the information necessary to run the network today."

Net/Adviser, which is listed at $200,000, is currently being installed at two large insurance companies for beta testing and is what's known as a rule-based expert system. Hundreds of if/then rules — if a certain condition exists, then the following action should be taken — were mined from the minds of experts in communications management and translated into the language of the software. Net/Adviser uses a program language that is a version of Lisp and Prolog. The Designet expert system uses an object-oriented version of Lisp called Flavor.

Knowledge engineering

Knowledge engineering, as it is called, involves interviewing and watching the communications managers and at least the three best operators at customer sites for a couple of days. Using a prepared document for a discussion base, Avant-Garde knowledge engineers asked the experts how they would solve hypothetical problems. Then the engineers observed them dealing with day-to-day situations. The result is a series of generic if/then rules that can be made more specific when the expert system is informed of the particular configuration of the customer's network components.

An example of one of the simpler Net/Adviser rules is the following: If: Tool A reports that Control Unit A is pending contact, and Control Unit B has timed out, and Tool C reports that Modem A has lost carrier, then: Reset Modem A and restart Control Unit B.

From this fairly elementary rule, the software of the expert system becomes more complex as it takes into account conditions that might exist for only a finite period of time and not be continuously activated.

The other expert system for telecommunications design and management, Designet from Bolt Beranek and Newman, Inc. (BB&N) in Cambridge, Mass., is distinctly different from Net/Adviser in three important ways. It is used for network design and not network management. It is not commercially available, but is an internal BB&N tool used when the firm is called in as a consultant to configure a network for a client. And the software is not based on if/then rules but on something known as object-oriented programming.

"Designing a network is a particularly troublesome job because it involves handling so much information these days — everything from thousands and thousands of end points to loads of pieces of equipment and circuits to put online," says Jim Herman, director of the Telecommunications Consulting Group at BB&N.

"So the problem we tackled was how to create an expert system with a design environment where the user sees only the information that he wants to see at that moment in time — information that is completely relevant to the problem he's working on — and where other information is available but just be-

Continued on **page 40**

Rothfeder is a free-lance writer based in Wyckoff, N.J.

From **page 39**

low the surface," Herman says.

To accomplish this on Designet, BB&N expert systems builders wrote a program that integrates windows, graphics and text and intelligently retains data from previous stages of network configuration by incorporating it into the current model while holding its details in a separate frame for later use. For instance, if network user access area issues are being examined, then all the information about the network backbone is repressed but can still be easily retrieved.

"This is known as context-sensitive filtering," Herman adds. "The expert system knows and reports on what is important now — not in a rote fashion but an intelligent fashion — and hides what is now unimportant from the designer. This is one of the key attributes of AI. It can create the environment in which the human decision maker can make better and more timely decisions, unencumbered by an overabundance of data."

The object-oriented AI programming used in Designet breaks down communications design technologies in terms of objects or actors and their states and behaviors. For instance, assume that communications devices are represented as one generic object and packet switches are represented as a second. To program them into the expert system software, they are listed in terms of what they have in common and where they differ.

They're both traffic-handling devices that have to store and account for the data that passes through them. Alternately, the communications device may be a traffic generator, while the packet switch is not.

Thus, knowing how the properties of these two network components are similar and how they differ, the expert system is able to pick, mix and avoid these components in various design situations by assessing their attributes.

The knowledge engineering that went into building the Designet object-oriented expert system software took two years of interviewing and observing master network designers. Communications managers working with BB&N on Designet say that when the network meets certain performance criteria, a good rule of thumb is to question whether the most expensive lines can be deleted without harming the overall network.

The best method for doing this, according to the communications managers, is to look at the least-used communications links and compare their characteristics, figuring out how much data they are carrying, how much it costs to carry this data and how much the productivity of the network would be reduced if any of these links were scrapped. This heuristic is built into Designet and can be experimented with until the network manager or designer is satisfied with his decision about how to deal with these links.

Heuristics — solving problems through trial and error — is a way that these expert systems, by mirroring human experts, provide insight as to what thought and decision-making processes go into communications management.

"In the last five years, there's been a revolution in what the network manager's goal is," BB&N's Herman says. "It used to be that his goal was to get the network optimally tuned. You were proud of it if you could say we have our lines 92.5% utilized in peak hours of the day. Now you'd get shot for saying that. The problem is that if the network is so optimally tuned and if somebody asks you to bring a new application into the network, it might take two years to order the circuits and move the information on board. So today, a manager is willing to give up some performance capabilities in return for flexibility.

"The whole value system is changed. Expandability and the realization that we don't know what people will want to do with the network in three years guides the manager today. And this is the type of philosophy we've built into the expert system," Herman says.

Similarly, the expert system designers at Avant-Garde found that making the network so it could accommodate users was the key management imperative to embed in the software.

"There are more tools available today to solve communications problems, and the network is far more adaptable, so managers have to be able to use the expert system to express this condition of management," Mills adds.

In some technical fields, expert systems have replaced human workers, but that does not seem to be the case with communications management and design. Analysts who are watching this field say that these expert systems act more as a support staff — either for in-house managers or outside consultants — than as an automated telecommunications guru.

"The expert system will stay put and will be a way to codify the experts' methods and techniques before they move on," says John MacDonald, an expert systems analyst at E.F. Hutton & Co., Inc. "Additionally, I don't believe these expert systems are going to be doing away with the outside consultant. They will just make the outside consultant's job easier. For better or worse, it seems that communications managers would rather deal with people as consultants than software."

Despite the benefits of using expert systems for communications management and design, there are those who say that these programs do not go far enough.

"These systems may optimize network time and reduce costs, but they are not expert systems," says Duff Mich, president of the RTP Group, Inc. in Pasadena, Calif., a telecommunications firm that produces a library of software called Telecommunications Management Aids, which is similar in scope to Net/Adviser.

"Being an expert in telecommunications requires more than knowing how to minimize costs. It involves providing communications alternatives and solutions based on what's coming out next year and the year after that. None of the expert systems around today even begin to touch on these issues. This software is three or four orders of magnitude shy of what an expert system for telecommunications should be."

Even expert systems designers agree with this position, although they say that whatever advantages the software brings to a company makes the system worthwhile.

"Expert systems are still clearly for experts," says Herman. "You can't just hand them to somebody who doesn't understand network management and expect him to magically come up with the right answer 100% of the time because he has this software at his side. These expert systems need to work next to somebody who knows what the work is about."

The consensus is that there will be no strong movement in the expert systems market for at least two or three years because development is ongoing. In addition, communications managers may be hesitant to embrace the technology because they are used to running their own show. Communications design and management expert systems will gradually gain popularity in the 1990s as users realize that they are not taking their jobs away but making their jobs easier.

From **page 35**

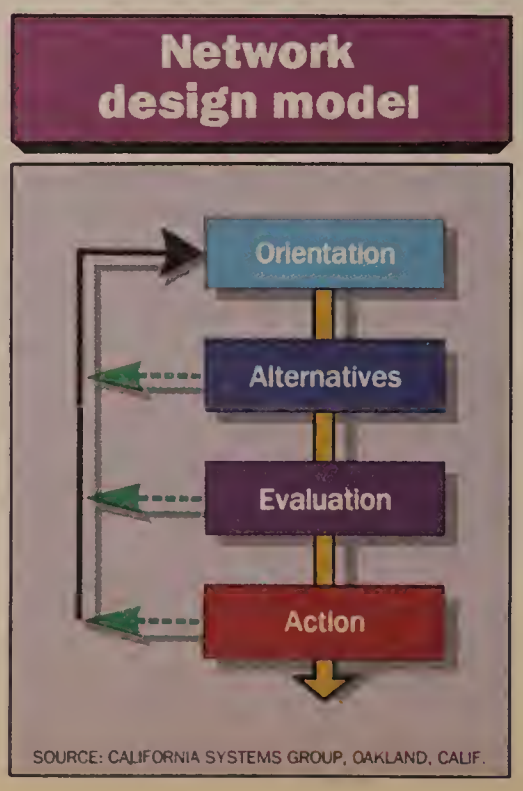
and make this the base case. Spend a lot of time in the first evaluation working through all the points and making the estimates.

After that, cases for the rest of the alternatives can be prepared more quickly, and relative costs and benefits can be calculated.

Follow through quickly in evaluating all alternatives. This allows evaluators to keep all information in their head during the evaluation process, thereby allowing them to use information and techniques applied to one alternative to help with the next.

The evaluations will have uncovered the need for more information. Perhaps more detail is needed about floor plans, cable ducts or product features. However, the planning committee now knows what is important to the evaluation and where to concentrate further efforts. This second data collection phase will be more effective than the first effort. This is also a good time to obtain proposals and quotations from vendors.

Meanwhile, the data collection process should continue, concentrating on quantifiable areas. Exact data is required only for major cost items. Next, the new information should be used to sharpen and complete the evaluations. Because little time has been spent so far on cost estimates, the planning committee will not be too attached to the results. This makes it easier to reposition the alternatives according to the updated evaluations.



By the end of the planning process, the committee typically will have worked out a half-dozen or so cases in detail. This still leaves a number of questions to resolve, some of which may come up during management presentations: For example, how do you evaluate a vendor? And what if the cost of wiring was underestimated?

To answer these questions, the design team must go back and expand on the original case studies with a series of "what if" variations. This sensitivity analysis is important to the quality of the results. Often, these final studies require collecting additional data because the results are sensitive to a particular scenario.

For example, the number of workstation connections to in-house computers vs. connections to remote computers may make the difference between using a local-area net or going with a data switch. If all computers are in the same building, a data switch may be adequate. More remote connections make a local-area network more attractive. Because the analysis is relatively easy compared with the task of data collection, it is usually better to minimize data collection up front and selectively supplement the appropriate information after the initial evaluation process has been completed.

Action

With a recommended solution, the planning committee should develop an implementation plan, even if it is not sure about all of the information. Next, all parties should critique the plan. The committee should treat the recommended solution as a conditional one. It should keep working on it until all parties are satisfied and then build the network according to plan.

By preparing informal, documented evaluations of alternatives, an organization will be able to arrive at the best possible networking solution. Even more important, the group will know what the key issues are for its own applications and find it easier to respond to new information and changes in direction that inevitably crop up.

NETWORK WORLD

THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES

Qualification Form for Free Subscriptions.

Please answer **ALL QUESTIONS,** sign and date the card.

Free subscriptions will be accepted only from individuals in the U.S. and Canada with active professional or managerial responsibilities in communications. The publisher reserves the right to limit the number of free subscriptions accepted in any business category. To qualify, you must answer all the questions below completely, **sign and date this form.**

If address has changed, attach mailing label with old address here.
☐ Address Change ☐ New subscription

First Name | Middle Initial | Last Name

Your Title

Company Name

Div. Dept.

Street Address

City | State | Zip Code

Is the above your home address? ☐ Yes ☐ No

I wish to receive a subscription to *Network World:* ☐ Yes ☐ No

Signature _____

Title _____ Date _____

Business Phone (_____) _____

PLEASE ANSWER ALL QUESTIONS, SIGN AND DATE THE CARD.

1 My primary area of activity. Circle ONE only.
I am involved in evaluating communications (data, voice and /or image) products and services:
1. for *use within my own* company/organization
2. for *resale* to other companies/organizations
3. Both

1a For communications, my primary responsibility is: Circle ONE only.
1. Data Communications
2. Voice Communications
3. Both

2 Circle only the ONE title classification which most applies to you.

Company Management
11. Chairman, Pres., Owner, Gen. Mgr., Partner, Director, CIO, VP, Dir. Head of Finance, Admin. Procurement

Communications Management
Data Communications
21. Management
VP, Dir., Mgr., Head, Chief: Data Communications, including Networks, Engineering, Design, R&D, Application Development
22. Supervisory/Staff
Supervisor, Head : Networking, Design, Analysis, Engineering, R&D, Applications, Services
Telecommunications
31. Management
VP, Dir., Mgr., Head, Chief: Telecomm., Voice Comm., including Networks. Engineering, Design, R&D, Application Development
32. Supervisory/Staff
Supervisor, Head: Networks, Design, Analysis, Engineering, R&D, Applications Services
Factory Communications
41. Management
42. Supervisory/Staff

MIS/Data Processing
51. Management
VP, Dir., Mgr., Head, Chief: MIS/DP, Systems Application Development, Operations, Office Automation
52. Supervisory/Staff: Supervisor, Head of System Design, Analysis, Applications

Others
75. Consultant
80. Educator
85. Financial Analyst
90. Marketing/Sales
95. Other _____

3 Job Function
Which one of the following best describes your functional involvement with communications (data, voice, and/or video) products? Circle ONE only.

Corporate
1. Business Management, Planning and/or Development

Communications System/Network
2. Management, Planning and/or Development
3. Implementation and/or Operation
4. Other _____

4 Which one of the following best describes the primary business activity of your organization at this location? Circle ONE only.

Consultants
11. DP/Communications Consulting Services
12. Consulting Services (except DP/Communications)

End Users
13. Manufacturer (other than computer/communications)
22. Finance/Banking/Insurance/Real Estate
23. Education
24. Medicine/Law
25. Wholesale/Retail Trade
26. Public Utility/Transportation
27. Mining/Construction/Petroleum Refining/ Agriculture/Forestry
28. Business Services (excluding DP/Communications)
29. Government: Federal
30. Government: State/Local

Vendors
41. Carrier: including AT&T, BOCs, Independent Telcos, Public Data Networks, Intern'l Records Carriers
42. Interconnect
43. Manufacturer Computer/Communications Equipment
44. Value Added Reseller (VAR), Systems House, Systems Integrator
45. Distributor
46. DP/Communications Services (excluding consulting)
95. Other _____

5 In which ways do you typically become involved in acquiring communications products (data, voice, and/or video) and services? Circle ALL that apply.
1. Recommend/Specify
2. Identify/Evaluate Potential Vendors
3. Approve the Acquisition
4. None of the Above

6 Check ALL that apply in columns A and B.
A. I am personally involved in the acquisition process (specification, selection, approval) for the following products and services:
B. These products and services are presently in use at this location:

A	B	*Product/Services*
		Computers
☐	☐	01. Micros
☐	☐	02. Minis
☐	☐	03. Mainframes
		Data Communications
☐	☐	04. Communications Processors
☐	☐	05. Comm./Networks Software
☐	☐	06. Digital Switching Equipment
☐	☐	07. Facsimile
☐	☐	08. Modems
☐	☐	09. Multiplexers
☐	☐	10. Protocol Converters
☐	☐	11. Network Mgmt. & Control
☐	☐	12. Test Equipment
☐	☐	13. 3270 Controllers
		Telecommunications
☐	☐	14. PBXs
☐	☐	15. Key Systems
☐	☐	16. Central Office Equipment
☐	☐	17. Integrated Voice/Data Terminals

A	B	*Product/Services*
		Transmission/Network Services Equipment
☐	☐	18. Microwave
☐	☐	19. Satellite Earth Stations
☐	☐	20. Local Area Networks
☐	☐	21. Wide Area Networks
☐	☐	22. Packet Switching Equipment
☐	☐	23. Fiber Optic Equipment
		Communications Services
☐	☐	24. Packet Switching Services
☐	☐	25. Cellular Mobile Radio Services
☐	☐	26. Electronic Mail
☐	☐	27. Enhanced Services
☐	☐	28. Centrex

7 Estimated value of communications systems, equipment and services:
A. which you helped specify, recommend or approve in *last* 12 months? Check only ONE in column A.
B. which you plan to specify, recommend or approve in *next* 12 months? Check only ONE in column B.

A	B		A	B	
1. ☐	☐	Over 10 million	6. ☐	☐	$100,000-250,000
2. ☐	☐	$5-10 million	7. ☐	☐	$50,000-100,000
3. ☐	☐	$1-5 million	8. ☐	☐	Under 50,000
4. ☐	☐	$500,000-1 million	9. ☐	☐	Don't know
5. ☐	☐	$250,000-500,000			

8 Estimated gross annual revenues for your entire company/institution:
Circle only ONE.
1. Over $1 billion
2. $100 million to $1 billion
3. $5 million to $100 million
4. Under $5 million

9 Estimated number of total employees at this location:
Circle only ONE.
1. Over 5,000
2. 1,000-4,999
3. 500-999
4. 250-499
5. 100-249
6. 50-99
7. 20-49
8. 1-19

3A05-86

NWW1

THANK YOU!

PLACE
POSTAGE
STAMP
HERE

Network World
P.O. BOX 1021
SOUTHEASTERN, PA 19398-9979

FOLD HERE AND MAIL TODAY

STOP. Did you do the following:

1. Supply old and new address if address has changed
2. Answer all questions
3. Sign and date form

Enclosed is my:

☐ Address change.
☐ New subscription request.

THANK YOU.

Network World

The Weekly for Leading Users of Communications Products & Services

PLEASE TAPE HERE

▶ OPTICAL DISK STORAGE

Good-bye, paper chase

Throw your document storage cares out the window.

BY KARYL SCOTT
Washington, D.C. Correspondent

Optical disk storage systems enable users to compress millions of images into a compact optical storage device. Instead of reeling through reams of documents, users can extract exactly what they need in a fraction of the time. Besides the obvious space-saving benefits, optical disk technology also allows for easy retrieval and transmission of data. Its applications are as numerous as the volumes of paper it is replacing.

General Electric Co. is using an optical disk storage and retrieval system and some homegrown communications to maintain a data base of five million complex engineering documents.

Design drawings can be transmitted via T-1 leased-line facilities or microwave transmission in about a minute within a campus of buildings or between states.

The system, designed by Integrated Automation, Inc. of Alameda, Calif., supports image communications between data bases at GE turbine manufacturing facilities in Schenectady, N.Y., and Lynn, Mass.

The New Jersey Division of Pensions is installing a Filenet Corp. optical disk storage system for a slightly different application — on-line data base access and archival storage and retrieval.

The Filenet product is a simple, off-the-shelf system, which makes it ideal for basic data compression and retrieval applications. The GE system, however, is more specialized — storing complicated drawings for its communications-intensive users. The Filenet system will be used to convert 25 million paper and microfilm documents currently taking up 80,000 square feet to eight optical storage devices, each consisting of 64 optical disks.

The applications in these two installations may be different, but the objectives are the same: less paper, faster access and more efficiency.

Early user of optical disks

GE was one of the earliest users of optical disk technology in an engineering environment. The staff of the Steam Turbine-Generator Operation (ST-GO) in Schenectady began looking at alternatives to its hard-copy data base of engineering drawings in 1981, according to James Kniskern, manager of Integration Systems at ST-GO.

ST-GO manufactures large steam turbine engines used primarily by electric utilities. A typical generator has more than 100,000 parts, which are manufactured in several configurations. The three million to five million drawings at ST-GO are used in the manufacturing, servicing and support of the generators, with approximately 25,000 new drawings issued every year.

ST-GO must provide customer support to equipment manufactured up to 40 years ago. Original drawings range in size from 8 by 11 inches to 34 by 44 inches, printed on mylar, linen and other materials. Thirty-five millimeter microfilm aperture cards are made of the original drawings for use by engineers and draftsmen.

Retrieving, printing and refiling originals and aperture cards by hand was time-consuming. Engineers sometimes had to travel from one building to another to get the needed drawing, and some of the drawings had deteriorated from use.

Worst of all, this hard-copy system could not be integrated into the network being developed under GE's Computer-Integrated Manufacturing program.

ST-GO conducted an intensive cost-benefit analysis of existing and emerging technologies. Microfilm aperture cards, computer-aided microfilm systems and optical disks were the options under consideration. Optical disk systems and communications capable of transmitting large quantities of document images and data were rated as the highest risk.

In 1983, GE began working with Integrated Automation on a prototype system. With the pilot project now completed, GE is moving into an expansion of the existing system. The GE optical disk system as it now exists consists of two main components: one dedicated to a directory of documents and the other to the capture and storage of document images.

System-level software located in the Digital Equipment Corp. VAX 11/780 control computer tracks all transfers of images within the system. The control computer also runs application software that monitors security, grants access to users and performs audit trail functions. The image subsystem captures the images, records and stores them on optical disks and transmits them for viewing or printing. The subsystem consists of several nodes or image controllers that control the aperture card scanners, magnetic storage devices for initial buffering of images and high-resolution VDTs.

The subsystem also consists of an image storage controller that maintains the optical disk autochanger, or "jukebox," that contains multiple disks storing a total of 100G bytes of information.

The control computer is linked to an image gateway, a high-speed, multiported switching device. The image gateway supports communications between multiple-image controllers and the control computer. It performs storage and retrieval tasks and manages terminal message traffic to and from the control computer.

It uses a standard X.25 communications format for point-to-point packet switching within a building, campus or through private and public networks to remote sites.

Although GE is using T-1 dedicated lines, 56K-byte Dataphone Digital Service and microwave transmission, the image gateway can also support transmission via 9.6K bit/sec voice-grade lines, fiber-optic channels, cable television subchannels through broadband modems and private automatic branch exchanges with an RS-449 interface.

GE's first attempt at transmitting document images was through Gemlink, a microwave service that was a subsidiary of GE. It has since been sold, and ST-GO is phasing out microwave transmission in favor of the more efficient T-1 using GE's on-campus telephone lines.

"It required a lot of homegrown solutions, but we were able to use our own lines, save the cost of leasing lines and get higher peformance than we would from microwave transmission," ST-GO's Kniskern says.

Many of the communications solutions at ST-GO were implemented on a trial basis, such as the microwave links.

"Initially, we built microwave towers on the campus and had to wait and observe how they performed. We noted how weather affected performance and adapted accordingly. Now we can say we're at the stage of implementing proven designs," Kniskern says.

The optical disk system is being expanded to four manufacturing facilities around the country. A GE airplane engine manufacturing group has purchased a similar system, and several other areas of business are looking at the feasibility of optical disk storage.

Drawings produced on GE's computer-aided design and manufacturing system, made by the company's Calma Division, can be transmitted electronically to the Integrated Automation system

☞ Continued on **page 42**

From **page 41**
through an RS-232 link. A conversion device between the two systems converts the graphic images from vector to raster mode. This is the primary means of getting new designs into the optical disk system, although ST-GO is still converting microfilm drawings via optical scanners.

Integrated Automation uses data compression techniques that optimize optical disk storage capacity and maximize the throughput of document images over standard communications links.

"Graphic images require far greater bandwidth than data," explains Christopher Myers, a senior sales representative at Integrated Automation.

"Large bandwidth requirements over a network will also degrade the performance of the network. To avoid these common problems, we compress the data and achieve acceptable transmission rates," Myers says.

The great compression

Compressing and managing data — 25 million documents, specifically — were the main reasons the New Jersey Division of Pensions recently began using an optical disk storage and retrieval system. The new installation consists of 13 terminals and one jukebox, eventually expanding to 50 terminals and eight jukeboxes.

The New Jersey Division of Pensions handles all pension programs for the state's 500,000 active employees and 100,000 retirees and also administers all social security and fringe benefit programs for state workers. The division invests and manages some $3 billion to $4 billion of pension contributions a year.

"In the legal sense, we are a fiduciary trust dealing with legal documents," explains John Prunetti, assistant director of the optical disk program. "It is critical that no one tamper with documents once they have been filed. The accuracy and permanence of our records were important factors in our choice of technology," Prunetti says.

The pension division currently uses hard copy and microfilm aperture cards. The division considered implementing aperture cards for all files but decided against it because aperture cards are not interactive and cannot be electronically linked to other data processing systems within the division.

Meanwhile, hard-copy files were becoming unmanageable. "It could take up to three days for someone to request and receive a file folder under our present system," Prunetti says. Lost folders and security were other problems that couldn't be easily managed with hard-copy files. After submitting a request for proposal for a turnkey system, the pension division chose Filenet.

Optical storage and retrieval units

The Filenet system consists of optical storage and retrieval units, terminals and scanners that attach locally to servers. Filenet provides two basic means of communications.

The first is the basic local-area network that allows images to be transmitted between workstations and servers attached to the optical disk storage facility, says Robert Castle, director of product marketing at Filenet.

Using the Xerox Co. Xerox Network Systems protocol and standard Ethernet coaxial cable, devices can be wired within one building or among a campus of buldings.

The second means provides Filenet terminal users with access to a corporate host. "Users at a Filenet workstation needing to access information in a host, can access the IBM or DEC VAX environment via 3278 terminal emulation," Castle says.

Filenet has amended the basic Ethernet system to handle the greater demand of document images.

"Transmitting an image over a local net creates a fair amount of overhead. Because we have to move many more packets in an image environment than in a data environment, we extend the traditional size of an Ethernet packet from 1,000 to 4,000 bytes. Network buffers are also built into the system to prevent error losses and blockage associated with larger packet sizes," Castle says.

Filenet's proprietary Workflo software not only manages the flow of document images but also provides electronic mail services to users as well.

Most of the optical storage systems on the market have basic local-area network capabilities, according to industry observers, but exotic communications such as wide-area networking and fiber-optic links are still beyond the requirements of users.

Right now, data compression and easy retrieval are still the top objectives for image processing users. However, users are demanding more communications capabilities, and vendors will have to produce them to stay in the market.

"There are existing technologies on the market that can handle all those demands. Communications is not an insurmountable problem," Castle says.



"As a consultant, I must make good recommendations to my clients on which products will enhance their networks. And, I want to be sure the vendors of these products have a future. Network World gives me a good sense of vendor viability."

Ron Orazine is a senior consultant involved in both data and telecommunications at Network Systems Design in Waltham, MA. He consults with large-scale communications users on the analysis and design of networks, as well as the design and selection of PBX systems. He is also the author of the firm's monthly client newsletter.

As a consultant to many leading communications users, Ron finds *Network World's* user-oriented editorial extremely helpful in his work. "In an industry that's churning as fast as telecommunications, it's hard to know what companies are going to survive," says Ron. "I must make good recommendations to my clients on which products will enhance their networks. And, I want to be sure the vendors of these products have a future. *Network World* gives me a good sense of vendor viability," he adds.

"*Network World* covers breakthroughs in the market, and the contracts section keeps me informed on how vendors are doing," Ron explains. "The articles are presented in a unique way, and the writing style is easy to comprehend." And, according to Ron, *Network World* gives readers all the news on the hottest topics. "I read every issue. Articles like 'AT&T Takes Aim at Centrex' give me an understanding of market strategies. And, there's been great coverage of networking, T-1s, leading edge installations, and office automation," he explains.

Network World is the first and only newsweekly written specifically for communications users. Over 60,000 purchase-involved subscribers, like Ron Orazine, look to *Network World* for the information that can help them—and their companies—stay ahead. If you market communications products and services, there's no better place to reach a powerful audience of communications buyers. Contact your local *Network World* sales representative and reserve space for your ad today.

Reading NETWORK WORLD

The Weekly for Leading Users of Communications Products & Services

375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 A PUBLICATION OF CW COMMUNICATIONS

T-3 from **page 2**
introduction of T-1. Second, T-1 lines are priced aggressively. T-1 facilities that support the equivalent of 24 voice channels cost roughly as much as 10 analog leased lines.

T-3 offers similar benefits. A T-3 link has 28 times the capacity of a T-1 line and costs roughly the same as seven of the lower speed facilities, according to Paul Jacobsen, product manager for AT&T's Accunet T45.

AT&T offers Accunet T45 on a contractual basis for up to five years. Users who commit to the service for five years also receive a substantial discount, according to Jacobsen. Accunet T45 is the only AT&T service with such a pricing structure, he added.

One shortcoming of T-3 is its dependence on fiber or microwave. It is not supported by twisted pair or coaxial cable. This limitation may hinder the service's acceptance.

AT&T has filed two Accunet T45 tariffs. Under the first, a customer with 28 T-1 lines can multiplex these links into a single T-3 facility at an AT&T central office. The T-3 service runs from central office to central office but cannot be extended to the customer's premises.

AT&T plans to add a second Accunet T-45 tariff to extend T-3 directly to customer premises. Jacobsen said the company is testing this service, and it should be available in November 1987.

Ed Wheeling, product manager for New York Telephone's Superpath services, said New York Tel can already take T-3 lines directly from a customer's premise.

Another concern with T-3 is the lack of network management facilities. Current T-3 multiplexers provide network management facilities at the T-1 level, meaning a network manager can run diagnostic tests for T-1 channels but is unable to test a complete T-3 line.

Also, the new multiplexers have limited switching capabilities. For example, customers can only divide the T-3 capacity in T-1 increments and cannot derive channels of varying speeds.

"We are a couple of years away from supplying users with that type of flexibility," stated Jeff Akers, product manager for network products and applications at AT&T. These limitations may be resolved with adoption of a new framing technique. Current multiplexers use an older AT&T-developed technique called M13 framing. Bell Communications Research, Inc., the research firm owned jointly by the divested Bell operating companies, recently developed a new set of standards known as Syntran.

Syntran supplies more flexible network management and switching capabilities at a lower cost than M13, according to Greg Cipriano, senior partner at Telecom Resources, Inc., a T-1 consulting firm.

Redundancy is another problem. Because of the great capacity of T-3 facilities, a single line could pump a company's lifeblood, meaning users would want to ensure its availability. The only way to back up these lines would be with a redundant T-3 link, an expensive proposition, according to Gerald Mayfield, vice-president at the Stamford, Conn., office of the DMW Group, Inc., a consulting firm.

Analysts say that T-3 will become widely available in a few years.

Only the largest companies currently have the bulk buying capabilities to warrant the services. However, new applications could evolve. Video was mentioned as the likely benefactor from T-3 large bandwidth.

Profit from **page 1**
By the late '70s, the plan to save money had turned into a money-making venture, Schrebel said. "We now have about 35% of the consumer finance companies in the U.S. on our system," he declared. "We are in virtually every state in the union, including Hawaii."

The non-Norwest credit companies pay on a monthly basis for DP and communications services. The Northwest Finance offices are also charged monthly. "We really operate as a separate profit center," explained Dee White, manager of data communications for Norwest Financial Information Services Group. "The cost load is distributed to the entire customer base, including Norwest Financial."

Of the three networks involved, the main one is a transaction processing network called the Swift network, serving the consumer finance offices. A smaller network serves a mortgage operation, and the company has begun offering a third network operation offering on-line office automation services.

The host system for the largest network is an IBM 3033 with a 3705 front-end processor. Data is transmitted from the network headquarters here to four manned, remote technical control centers via a 9.6K bit/sec transmission pipe. When the data reaches the the remote locations, it is sent to the finance offices at 1,200 bit/sec on multidrop circuits handling between 22 and 38 drops per circuit.

Since the early days of the network, the communications staff has been very involved in network optimizing.

"We have software programs that create message transaction models that tell us how long messages stay in the system and how many transactions occur, either by line or by terminals or by system," explained Scott Sanger, Norwest's lead communications analyst. "We take that data and create a message analysis program, and from that we can calculate average response time and determine how many drops can be placed on a line.

"We run the network traffic through a message analysis process," White said. "That ascertains the quantity as well as frequency of transaction types. From that we determine peak periods. We bring all that traffic together to create a traffic rate table. We can pretty well forecast the peak transaction rate that each office will generate per business on a given day."

Norwest uses the Networker, a network design and management software package from The DMW Group, Inc., to optimize its network design. "Tariff changes and growth keep us always tuning the network," White said.

Even using the Networker software, which runs on one of the company's IBM mainframes, it is difficult to keep up with all of the recent tariff changes. Still, Sanger said the company is able to reduce costs significantly by using the most efficient network configurations.

Access from **page 32**
and transport area competitive market.

Competitors of dominant carrier AT&T Communications, Inc. are still pressuring the BOCs, Judge Greene, who is overseeing the Modified Final Judgment, the Justice Department and even the Federal Communications Commission to implement equal access as soon as possible.

The provision of full equal access — now being broadly defined to include all end offices, 800- and 900-services plus a number of other services — may become a condition to future business relief for the BOCs. It may also dictate the future regulatory and deregulatory environments for not only the BOCs but also for AT&T Communications.

Strategy from **page 33**
ating company, or it must have enough staff expertise to deal with the many service offerings, rate structures, circuit ordering and acceptance processes of all RBOCs in which the organization has major installations.

This latter approach makes sense only if the user organization's combined inter-Lata voice and data traffic is sufficient to justify the economical use of T-1 facilities. Because this strategy is based on dedicated facilities, communications needs should be relatively stable and predictable.

The most appropriate candidates for a Lata-pure/T-1 gateway approach are state governments and public utilities.

They're regionally based, have high-traffic concentrations within Latas and tend to grow at a relatively predictable rate.

One step removed from this "best case" are businesses such as regional banks, which are regionally concentrated, but are subject to takeovers and to wide variability in the growth rate of data traffic, and any large industrial or governmental organization with regionally concentrated traffic.

At the opposite end of the spectrum are large, nationally deployed businesses that have one or two locations with, at most, a few hundred employees in each of many Latas. Examples include retailers and service companies. In such organizations, it is unlikely that high capacity digital pipes will economically "prove in" except to connect headquarters and data processing complexes. These customers typically won't want to go directly to the telephone companies for dedicated facilities.

The best arrangement may be a distributed strategy that serves dispersed, low-volume locations with switched voice services, and a hybrid arrangement of X.25 public and private packet-switched services (as alternatives to multidrop private lines) for data traffic.

These examples show that a long-range corporate network strategy should be developed either before or concurrently with network design and optimization projects. That's the only way to prove to upper management that an organization's network planning is driven by the telecommunications planner's requirements and not by a vendor's strategy.

AI from **page 33**
switches or other network elements are supposed to work, what can go wrong with them and what to do when something does go wrong.

Both Smart and Becon have demonstrated the value of providing automated assistance in solving well-understood, recurrent problems.

The chief virtue of AI is that it brings the tremendous cycling speed of modern computers to bear in selecting from among a number of tried and true approaches.

Experience with Becon has proven AI as a potent tool for human experts who are called upon to make quick and accurate assessments of problems and recommend effective solutions.

Future developments in AI will build upon the capabilities of expert systems to do human-like reasoning. Indeed, this is the distinction between a knowledge-based system and a conventional computer program.

Other expert systems under development at Bellcore include a system to troubleshoot circuits automatically and an aid to managers and casual users who are trying to formulate efficient data base queries.

Projects are also under way that explore the use of AI in languages other than the highly specialized ones, such as Lisp, that are generally used.

Finally, and perhaps predictably, some research is designed to facilitate or even automate the knowledge engineer's task of extracting the human expert's rules of thumb. Regardless of the way in which AI develops, the impact on telecommunications will be profound.

The developmental lines of computer science and telecommunications have converged to the point where they have become almost indistinguishable.

And the advent of a new generation of software systems that will make all computers as convenient to use as the telephone can only accelerate that trend.

Conflict from **page 1**

choice.

The interexchange carriers, on the other hand, would like to provide enhanced switched network services that customers could access with high-speed digital facilities leased from their local telephone company or a bypass carrier.

"In the interexchange carrier view, your traffic will be treated on a switched, usage-sensitive basis," according to Joaquin Gonzalez, service director for enterprises network service at Gartner Group, Inc., a Stamford, Conn.-based research and consulting company. "When you come out of the network, you go on dedicated lines.

"The local telephone company view of the world is the exact opposite," Gonzalez said. "When you are in their turf you will use their central office switching capabilities — that is, Centrex — and get to other intelligent network service islands through dedicated interexchange carrier lines."

Richard Snowden, director of new service concepts for AT&T, downplayed the idea of a growing conflict.

"There is not some sort of battle of the titans about to take place," Snowden said.

He conceded, however, that "most intercity carriers would draw a picture in which the local exchange carrier is a dumb pipe connecting users to the interexchange carriers intelligent network. And the local exchange carriers would draw just the opposite picture."

A strategic goal common to both groups is to provide enhanced services on switched networks and move users away from private lines where possible.

The interexchange carriers, for example, have begun offering enhanced switched services like AT&T's Software Defined Networks. For their part, the local exchange carriers have sought, and received, a spate of rate increases on the local channel portion of private-line service during the past year.

Page Montgomery, vice-president of Economics and Technology, Inc., a Cambridge, Mass.-based consulting company, said there is already ample evidence that AT&T would like users to migrate from dedicated private networks to AT&T's switched, virtual network offerings.

The Ad Hoc Telecommunications Users Committee, representing some of the largest users in the country, and other industry observers have often charged that local exchange carriers are attempting to raise private-line access charges in order to discourage private-line service in favor of switched services.

The apparent strategy conflict will present users with some tough choices. There is no quick and easy way to discern which camp's scenario is best.

For customers with many locations within a local operating company's territory, an intelligent network provided by a local exchange carrier may be an attractive alternative, particularly if a great number of locations are within one Lata.

"Within the Lata, the operating companies can handle end-to-end service and maintenance," said Robert Ellis, president of The Aries Group, Inc., a Rockville, Md., firm that provides network and tariff analysis services. "They own all the people and facilities. It's just like the old Bell System."

Montgomery said he believes customers could be convinced to buy intelligent network services provided by local exchange carriers and routed between Latas by interexchange carriers, particularly if they have many locations in one Lata.

Gerald Mayfield, president of the professional services division of Ann Arbor, Mich.-based The DMW Group, Inc. and an authority on long-distance service, said regulations that prohibit the former Bell operating companies from offering inter-Lata service could hinder their efforts to market intelligent network services to large users with sites in many Latas.

The long-haul carriers, AT&T in particular, will prey on the exchange carrier weakness and attempt to attract customers by touting their ability to deliver enhanced network services throughout the country without worrying about state or Lata boundaries.

"The local exchange carriers have different terms and conditions and service offerings from one region to the other," Gonzalez agreed. "The thing communications managers want is consistency."

The local exchange carriers are beginning to see the long-haul carriers' attempts to establish beachheads. According to Dennis Mardon, corporate director of strategic technology planning for Nynex Corp., "The large interexchange carriers do seem to be entering the marketplace and dealing directly with the end user and positioning themselves as the network of choice. For example, [take] AT&T's offering of SDN, and AT&T's positioning itself as an ubiquitous providor of ISDN by the middle of 1987."

Mardon and representatives from other Bell operating companies said that, as major telecommunications providers in their respective regions, they are well equipped for competition.

"We have the ability to be the lowest cost provider of service in our area," said Ed Brown, vice-president for network strategies at Bell Atlantic Corp. "We have modern technology and digital capability with our switching systems and fiber and our T-1 deployment. You couple our low cost with ability to provide valuable network services and I think we can compete very well in that area."

Brown pointed out that the BOCs are not allowed to market services jointly. But, he added, the BOCs jointly own Bell Communications Research, Inc. Brown said, "One of the purposes of that organization is to make sure the network is still a network under divestiture."

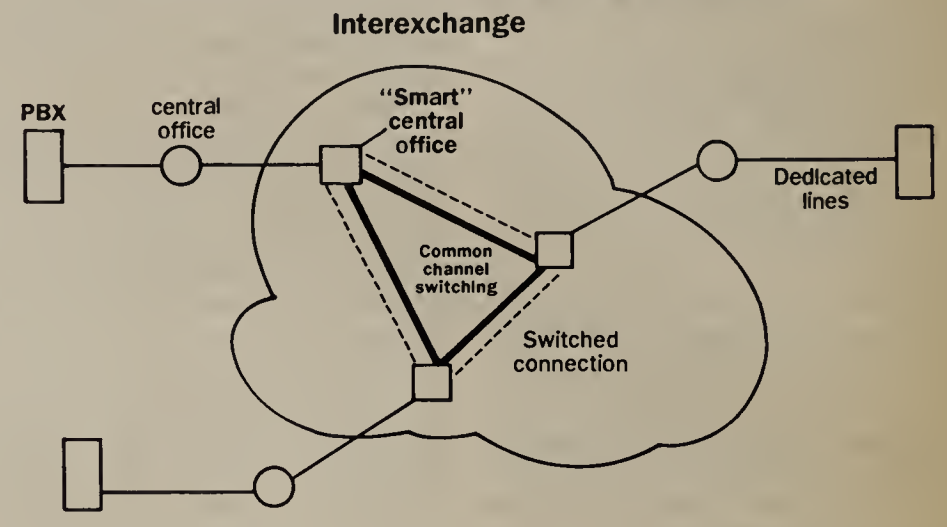
> *"'There is not some sort of battle of the titans about to take place,' Richard Snowden said."*

Despite Brown's optimistic assessment of the regional BOCs' ability to maintain network compatibility, Gartner Group's Gonzalez believes that the BOCs' inability to offer one unified virtual network will be a major stumbling block in their attempts to compete with the interexchange carriers for many of the large users who will be seeking nationwide virtual networks.

For users, however, the most important aspect of the brewing conflict, according to Gonzalez, is understanding the strategies of the competing camps.

"If you know what is going on at the highest strategic levels, you can select the strategy that gets you where you want to go with your network," Gonzalez said.

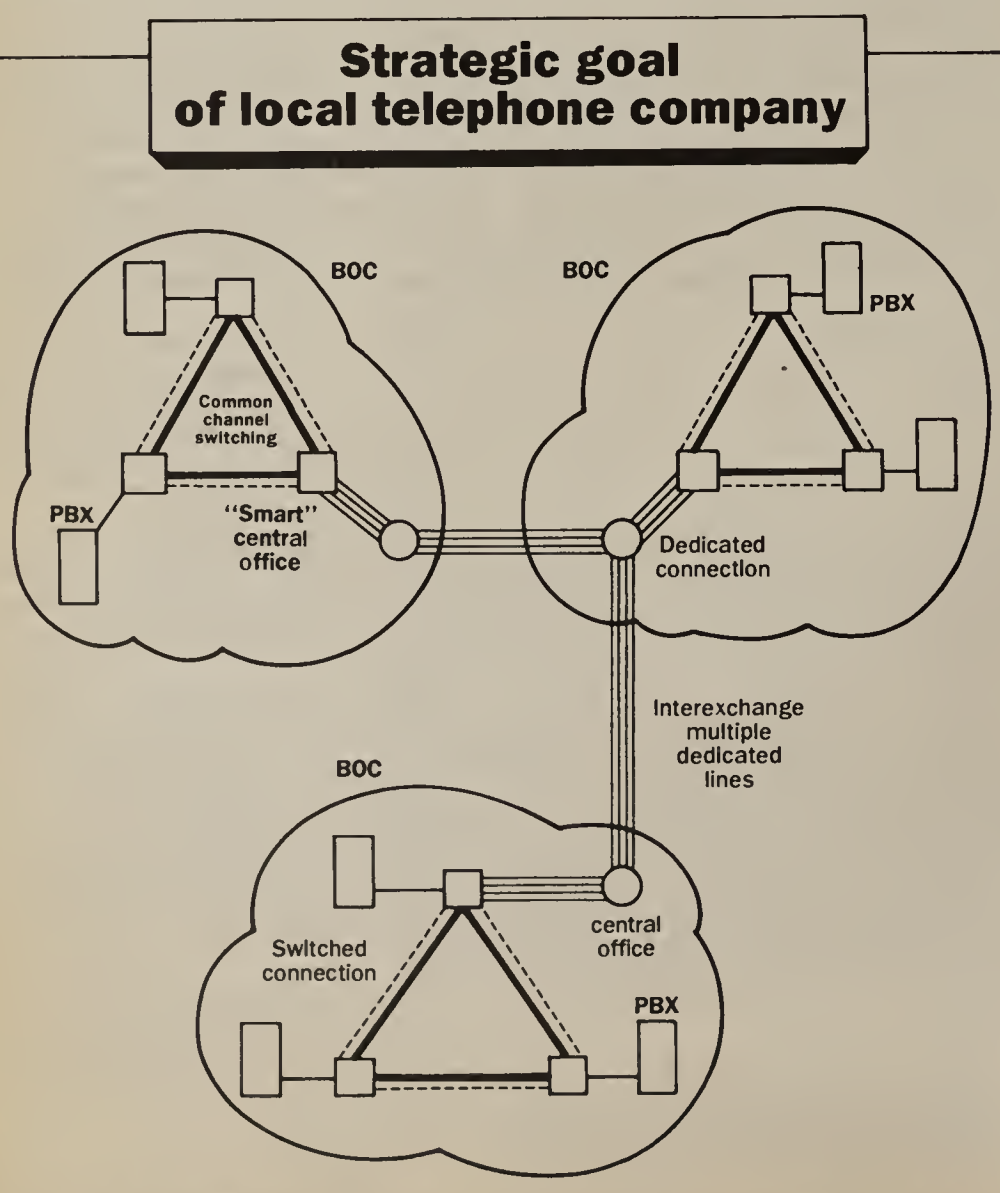
Strategic goal in interexchange carriers



The strategic goal of the interexchange carriers is to develop an intelligent network, illustrated here by the central cloud, which is accessed by high-speed digital services leased from local carriers.

SOURCE: GARTNER GROUP, INC., STAMFORD, CONN.

Strategic goal of local telephone company



The local exchange carriers' strategy, on the other hand, is to encourage users to build intelligent networks within their local service areas and then connect these clouds with high-speed digital links.

SOURCE: GARTNER GROUP, INC., STAMFORD, CONN.

CAREER ANNOUNCEMENTS

Are you looking for...

Data Communications Managers?
Telecommunications Managers?
Telecommunications Engineers?
Network Managers?
Communications Networks Specialists?
Factory Communications Managers?
Systems Analysts?
Telecommunications Analysts?
Transmission Managers?
Data Communications Consultants?
Systems Engineering Managers?
Directors of Information Services?
Project Engineers/Network Development?
Telecomm. Software Programmers?
Systems Network Programmers?
Senior Datacomm. Specialists?
Telecomm. Network Planners?
Manager Voice Communications?
Senior Satellite Systems Engineers?
Project Leaders?
Group Datacomm. Sales Managers?

No matter who you want to recruit,
Network World
delivers your message
to the right audience
of communications professionals.
For details, call Gina Ciampa,
Classified Advertising Dept.,
toll free at

800-343-6474
(617-879-0700 in MA).

DATA COMMUNICATIONS PROFESSIONALS

Openings in New York City; Wash., D.C., Atlanta, Georgia; Dallas, Texas

Career opportunities available with an expanding leader in Packet Switching technology. Successful candidates must sustain creative high performance in an entrepreneurial work environment. Compensation includes salary, performance bonuses and stock options plus full fringe benefits.

● **SOFTWARE ENGINEERS:** Design/implement real time multi-procng/tskng O.S. for O.S.I. Archtctr-X.25 Sync PADS; Upgrade current line of Prdcts to new atchtctr. REQ: BSEE or BSCE or MSCS or equivlnt; 2 yrs exp Multi-tasking code; prgrmng in mchne language, esp 68000/Z80/8086-C exp helpful; wrkng knwldg Sync Comm Prtcls, exp X.25, SNA/SDLC, Bi-Sync, ablty debug usng logic analyzers/in-circuit emulators. **NYC.**
COMP: $30's to 40's K.+ perf bonuses.

● **NETWORK SYSTEMS ENGINEERS:** Define customer needs; Provide diagnostic support for customers and mktg staff; Set up pre-installation verification test beds; Wrk closely w/mktg as tech support in pre/post sales activity; Participate in network design & configuration proposal writing, site surveys, tech presentations & demos; Install field upgrades & engrg changes; Tape and analyze traffic for protocol evaluation. Train junior personnel. **NYC, ATLANTA, DALLAS.** **COMP: $30-40's K + perf bonuses.**

● **NETWORK SYSTEMS ENGINEER FEDERAL SYSTEMS GROUP:** REQ: Extensive knwldge of packet switching technology particularly in Defense Data Network; familiarity w/fedl data comm market place, exp in procurements & proposal writing. Exp installing & maintaining data comm equip & providing tech support to mktg team; excel writing/verbal skills. **WASH, D.C.** **COMP: $30-40's K + perf bonuses.**

● **FIELD ENGINEERS:** Install & configure PDI X.25 Sync Protocol prdcts; Use test equip/datascopes for protocol ID/trblshtng; Track instltns thru modem lnks; Render tech support to end-users via phone monitor escalation procedures for trouble desk. ID/Sort/Route srvc calls rqrng mrktng/engnrng support. Configure eqpmnt in-hse for tests/demos/evals. Supervise Jr personnel in field. REQ: BSEE or BSCE. (AAEE ok if exp); 3 yrs exp field support with packet switching eqpmnt. Extnsve trvl, 1-3 day trips/wk; Exc spkn & wrtn English; Good custmr mngmnt skills; US Citizn; **NYC.** **SAL: $20's-30's K**

● **FIELD SERVICE REPS:** Install PDI Products; Use test equip/datascopes for protocol ID/trbleshtng; Track instltns thru modem lnks; Render first line response to end user trouble requests via phone. REQ: 2 yrs exp servicing/installing packet switching eqpmnt. Extensive travel. **NYC.** **SAL: $18-20's K.**

● **TECHNICAL WRITERS:** Develop tech manuals, usergdes & trblshtng mnls for new prdcts. REQ: Exc wrtng, editing, W.P. skills; trnng in tech wrtng; qckly lrn complex datacomm tchnlgy & make undrstndbl for readers. **NYC.** **SAL: $20's-30's K**

● **SALES REPS:** Sale of X.25 Sync PADS & related Data Comm prods; proposal wrtng; REQ: 2 yrs proven track record with Packet Switching Equipment Sales; Some travel. **NYC.**
COMP: $30's K + Comm, Expenses, Stock Options.

● **PERSONNEL OFFICER:** Recruitment and selection all positions; Job dscrptns; Coadmin. Comp/Benefits Plan; Expand Prsnl Procdrs. REQ: 3 yrs exp-Prsnl Off.–Computer Indust. **NYC.** **SAL: mid-$20's to 30's K**

Please forward resumes to Mr. C. Aponte

PROTOCOM DEVICES, INC.
1666 Bathgate Ave, Bronx, New York 10457
Equal Opportunity Employer

BIDS AND PROPOSALS

BASEBAND LAN CONTRACTORS

The New Jersey Turnpike Authority invites qualified contractors to bid on the installation of a local area network with 275 drops in its administration building, East Brunswick, New Jersey. Prospective bidders must submit a prequalification form indicating their qualifications by October 15th, 1986. For more information and forms please respond to

Senior Bid Supervisor
New Jersey Turnpike Authority
PO Box 1121
New Brunswick, New Jersey 08903
(201) 247-0900

Calendar

Oct. 14-16, Atlanta — Telemarketing and Business Telecommunications — 1986. Contact: Technology Marketing Corp., One Technology Plaza, Norwalk, Conn. 06854.

Oct. 16-17, Washington, D.C. — IBM, AT&T and Alternative Suppliers: Telecommunications Strategies. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

Oct. 19-22, Toronto — 1986 International Telecommunications Energy Conference. Contact: Norman S. Siomra, C&D Power Systems, 9 Bradwick Drive, Concord, Ont., Canada L4K 2T4.

Oct. 20-22, New York — Unix Expo. Contact: National Expositions Co., Inc., Suite 12A, 49 West 38 St., New York, N.Y. 10018.

Oct. 20-24, Orlando, Fla. — Optical Fiber Communications. Contact: George Washington University, Continuing Engineering Education Program, Washington, D.C. 20052.

Oct. 20-24, Boston — Writing Procedures, Policies and Documentation. Contact: Laurel Lewis, Information Mapping, Inc., 275 Wyman St., Waltham, Mass. 02154.

Oct. 21-22, Newport, R.I. — Newport Conference on Fiber-Optic Markets. Contact: Kessler Marketing Intelligence, America's Cup Avenue at 31 Bridge St., Newport, R.I. 02840.

Oct. 21, New York — Electronic Linkage of International Markets. Contact: Dennis Waters, Waters Information Services, Inc., P.O. Box 2248, Binghamton, N.Y. 13902.

Oct. 22, Chicago — MAP: An Introduction. Also Dec. 9, San Francisco. Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

Oct. 22-23, Washington, D.C. — Telecommunications Today. Also Nov. 12-13, Denver, Colo. Contact: Telecommunications Course, Federal Publications, Inc., 1120 20th St., N.W., Washington, D.C. 20036.

Oct. 22-24, San Jose, Calif. — Internetworking & Advanced Protocols. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Oct. 22-25, Washington, D.C. — International Computers & Communications 1986-2000. Contact: IC&C, P.O. Box 17392, Washington, D.C. 20041.

Oct. 23-24, Monterey, Calif. — Selling ISDN & ISDN Centrex. Contact: Probe Research, Inc., P.O. Box 590, Morristown, N.J. 07960.

Oct. 25-26, Atlanta — ISECON '86. Contact: Kathy Brittain White, University of North Carolina — Greensboro, Information Systems, Greensboro, N.C. 27412.

Oct. 27, Anaheim, Calif. — Teleconferencing: Steps to Take, Moves to Make. Contact: National University Teleconference Network, 332 Student Union, Oklahoma State University Campus, Stillwater, Okla. 74078.

Oct. 27-28, Bethesda, Md. — The Postdivestiture Tariffs and their Impact on Large Networks. Contact: Janet Hunter, The Aries Group, Inc., Suite 320, 1500 Research Blvd., Rockville, Md. 20850.

Oct. 27-29, Boston — Audiotex. Contact: Online International, Inc., 989 Avenue of the Americas, New York, N.Y. 10018.

Oct. 27-30, Dallas — 1986 National Data Base and Fourth-Generation Language Symposium. Also, Dec. 2-5, Boston. Contact: Digital Consulting Associates, Inc., 6 Windsor St., Andover, Mass. 01810.

Oct. 27-31, San Francisco — SNA: Architecture, Products and Current Implementations. Also, Dec. 1-5, New York. Contact: Susan Boettcher, Information Breakthroughs, 445 W. Main St., Wyckoff, N.J. 07481.

Oct. 28-29, Washington, D.C. — The Fowler Challenge: Deregulation and Competition in the Local Telecommunications Market. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

Oct. 29-31, Colorado Springs — An Intensive Introduction to Integrated Data/Telecommunications. Contact: The American Institute, Inc., Carnegie Building, 55 Main St., Madison, N.J. 07940.

Oct. 30-Nov. 1, Miami — The Ninth South Florida Computer & Business Equipment Showcase. Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Nov. 10-14, Las Vegas, Nev. — Comdex/Fall '86: The Eighth National Fall Computer Conference and Exposition for Independent Sales Organizations. Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Nov. 19-20, Boston — Educational Seminar on T-1 Facilities and Networking. Contact: Timeplex, Inc., 400 Chestnut Ridge Road, Woodcliff Lake, N.J. 07675.

LEGAL NOTICE
U.S. POSTAL SERVICE
STATEMENT OF OWNERSHIP, MANAGEMENT and CIRCULATION
(Required by 39 U.S.C. 3685)

1. Title of Publication: *Network World*
2. Date of filing: October 3, 1986
3. Frequency of issue: weekly, except for a single combined issue the last two (2) weeks in December.
3a. Number of issues published annually: 51
4. Location of known office of publication: 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (Middlesex County).
5. Location of the headquarters of general business offices of the publishers: 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (Middlesex County).
6. Names and addresses of the publisher, editor and managing editor: Publisher, F. Douglas DeCarlo, 375 Cochituate Road, Framingham, MA 01701-9171. Editor, Bruce Hoard, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171. Managing Editor, John Gallant, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171.
7. Owner: International Data Group, 5 Speen St., Framingham, MA 01701-9192.
8. Known bondholders, mortgages and other security holders owning or holding 1% or more of total amount of bonds, mortgages or other securities: International Data Group, 5 Speen St., Framingham, MA 01701-9192.
9. For completion by nonprofit organizations authorized to mail at special rates: Not applicable.
10. Extent and nature of circulation:

	Average No. Copies Each Issue During Preceding 12 Months	Actual No. Copies of Single Issue Published Nearest to Filing Date
A. Total number of copies printed (net press run)	70,419	69,984
B. Paid circulation		
1. Sales through dealers and carriers, street vendors and counter sales	None	None
2. Mail subscriptions	61,319	61,046
C. Total paid circulation	61,319	61,046
D. Free distribution by mail, carrier or other means, samples, complimentary and other free copies	7,343	7,134
E. Total distribution (Sum of C and D)	68,662	68,180
F. Copies not distributed		
1. Office use, left over, unaccounted, spoiled after printing	1,757	1,804
2. Returns from news agents	None	None
G. Total (Sum of E, F1 and 2 — should equal net press run shown in A)	70,419	69,984

I certify that the statements made by me above are correct and complete.

Alice Coronella
Traffic Manager

Network World Sales Offices

Ron Mastro
National Sales Director

Pam Valentinas
Manager/Marketing
& Sales Operations

Karen Wallace
Account Coordinator
375 Cochituate Road.
P.O. Box 9171
Framingham, MA 01701-9171
(617) 879-0700

BOSTON
Maureen Sebastian
375 Cochituate Road.
P.O. Box 9171
Framingham, MA 01701-9171
(617) 879-0700

NEW YORK/PHILADELPHIA
Joan Daly
Paramus Plaza I
140 Route 17 North
Paramus, NJ 07652
(201) 967-1350

WASHINGTON, D.C.
Bill Burke
11B3 Spa Creek Landing
Annapolis, MD 21403
(301) 268-6179

SAN FRANCISCO
Chris Clyne
3350 West Bayshore Road
Suite 201
Palo Alto, CA 94303
(415) 328-4618

ATLANTA
Tom Tolbert
1400 Lake Hearn Drive,
Suite 330
Atlanta, GA 30319
(404) 394-7509

CHICAGO
Fran Jonikaitis
2600 South River Road,
Suite 304
Des Plaines, IL 60018
(312) 827-4433

LOS ANGELES
David Beardslee
18004 Sky Park Circle,
Suite 100
Irvine, CA 92714
(714) 545-7278

CLASSIFIED ADVERTISING
Gina Ciampa
375 Cochituate Rd.
Framingham, MA 01701-9171
(617) 879-0700

Network World is a member of the CW Communications/Inc. group, the world's largest publisher of computer-related information. The group publishes over 50 computer publications in more than 20 major countries. Nine million people read one or more of the group's publications each month. Members of CWCI group contribute to the *Computerworld* News Service, a daily on-line service offering the latest on domestic and international computer news. Members of the group include: ARGENTINA'S *Computerworld/Argentina;* ASIA'S *Asian Computerworld;* AUSTRALIA'S *Computerworld Australia, Australian PC World* and *Macuworld;* BRAZIL'S *DataNews,* and *PC Mundo;* CHINA'S *China Computerworld* and *China Computerworld Monthly;* DENMARK'S *Computerworld/Danmark, PC World* and *Run (Commodore);* FINLAND'S *Mikro;* FRANCE'S *Le Monde Informatique, Golden (Apple), OPC (IBM), Theoreme* and *Distributique;* GERMANY'S *Computerwoche, Infowelt, PC Welt, Computer Business,* and *Run;* ITALY'S *Computerworld Italia* and *PC Magazine;* JAPAN'S *Computerworld Japan;* MEXICO'S *Computerworld/Mexico;* THE NETHERLAND'S *Computerworld Netherlands* and *PC World;* NEW ZEALAND'S *Computerworld New Zealand;* NORWAY'S *Computerworld Norge* and *PC Mikrodata;* SPAIN'S *Computerworld Espana, PC World* and *Commodore World;* SWEDEN'S *ComputerSweden, Mikrodatorn,* and *Svenska PC World;* SWITZERLAND'S *Computerworld Schweiz;* THE UNITED KINGDOM'S *Computer News, PC Business World,* and *Computer Business;* VENEZUELA'S *Computerworld Venezuela;* the U.S. *Amiga World, Computerworld, inCider, Infoworld, MacWorld, Micro Marketworld, PC World, Run, 73 Magazine, 80 Micro, Focus Publications* and *Network World.*

HORRELLSCOPES

BY EDWARD HORRELL

In communications today, it takes more than just good business sense to survive; it requires celestial guidance.



Pisces: Wrapping fish is about all the use customers can get out of the so-called "comfort letters" from manufacturers of private branch exchange systems.

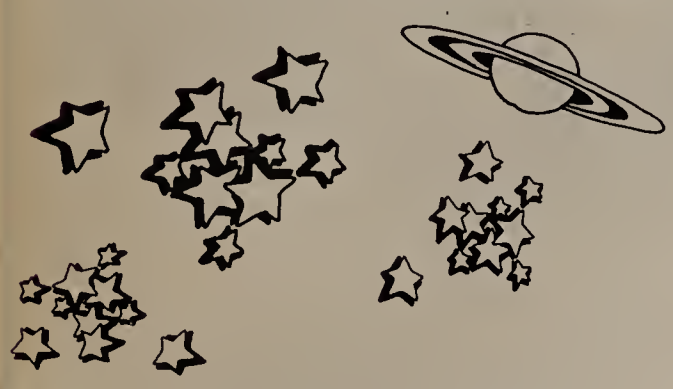
On the surface, the letter idea sounds like a star. The basic concept is that the PBX manufacturer writes to prospective systems buyers and promises to provide maintenance and installation support in the event the present distributor goes into a tailspin.

These comfort letters state that, in the event the distributor fails to perform or goes out of business, the manufacturer will either maintain the system or appoint someone to do it.

That sounds grand. The letter, however, will not guarantee the cost of maintenance. And this is crucial. The typical rate they charge covers expenses and what they call "the current daily rate" for maintenance. Even that doesn't appear to be astronomical until a customer who lives in California learns his system has to be maintained by someone from New York.

Many distributors are Pisces by nature, anyway. They are drifters and changers. A distributor backed by a strong manufacturer is fine as long as the manufacturer is willing to stand close behind the distributor and not a galaxy away.

Users are best advised to buy their PBX systems on the strength of the distributor. Nothing hurts like trying to find someone to pick up maintenance on an orphan system.



Cosmic catastrophe of the month

IBM's handling of Rolm Corp. is disgraceful. Once the pride of the telephone industry, Rolm is now a defensive, bureaucratic organization with such a mass exodus of key personnel, it makes Moses and his expedition look paltry.

In spite of all the talk about leaving the laid-back culture of Rolm alone, the exact opposite has happened. Talk to any long-time Rolmie, and he will say things are awful there. Morale has been sucked into the black hole. Competitors are rocketing into the space left by Rolm and claiming that their products connect better with IBM than IBM's own company, Rolm.

And now "Horrellscopes" has learned that the formerly unique and admirable exclusive distribution policy for Rolm PBXs is soon to be abandoned.

Horrell is president of Mitchell & Horrell, Inc. in Memphis, Tenn.

The IBM executives overseeing Rolm must be Scorpios, the most fiercely militant and combative of the signs. Scorpio is also the sign most inclined to destruction. And it's not like IBM to employ such space cadets.

Top IBM officials should take a close look at what is going on out in California. They have two options to rescue the operation before it is too late.

First, get out and let Rolm be itself. Admit that the company's success was because of its aggressive, negotiating, selling style. Or change the name to IBM West, and remove any memories of what was one of the brightest stars in the telecommunications universe.



Capricorn: The hungry interconnect industry is hunting for some way to stay alive in the telecommunications jungle.

The normally rational, patient Capricorn is rumbling now as most of the large interconnect companies are reporting little or no profits. The industry is rampant with acquisitions and failures.

Specifically, look for aggressive companies such as Telplus and Centel Business Systems to have magnetic pull in the cosmic acquisition atmosphere — at least for the immediate future.

The victims of this gravitational pull will be the small firms, the mom-and-pop shops of the industry, which have customer bases that won't provide much business after the initial sale.

Users should observe the way the planets are lining up here. Customers should check the finances of companies before buying telephone systems or any other kind of service-sensitive equipment.

Check the earnings of the company over the last few years. For public companies, look at the annual report. For closely held companies, request the most recent audited financial statements. If they refuse, write that firm off the face of the earth.

Another caution: Check the manufacturer's guarantees in case of a distributor's default. Read the guarantee letter closely to see how strongly the manufacturer backs the distributor.



Virgo: Customers of interconnects would be wise to adopt the well-ordered, common-sense quality so prevalent in this sign.

With profit margins at an all-time low, interconnect vendors are realizing that their best customers are their present customers.

So most of them are developing plans to sell auxiliary equipment to their existing base of customers. These interconnect firms see the installed customers as rocket boosters to the company's economic health.

Users should be wary of the prices paid for equipment after the initial sale. Customers should keep up-to-date price lists and delivery schedules from their primary vendor.

And users shouldn't be too starry-eyed about their vendors. Chances are the auxiliary equipment is sold by other vendors that offer the same add-on products. If prices seem too high from the original seller, pick another vendor.



Shooting stars

It was a brave, new world . . . for a while.

But now the combined changes caused by the Federal Communications Commission and Uncle Sam are leading us back to the days of predivestiture. The FCC has paved the way for the regulated companies to combine marketing forces with their deregulated subsidiaries to sell to end users.

So it will be back to one-stop shopping soon. Add the demise of the investment tax credit, and the price of hardware goes up 10%. Take away the incentive to buy, and the only thing left is to rent equipment.

Companies with plenty of cash, such as Northern Telecom, Inc., will soon be preaching the benefits of renting systems from distributors. Northern Telecom will offer "partnerships" with selected distributors, and the company will hit the rental market heavily.

And no exploration of profitable space will be ignored. Watch other companies follow the big planets.



Gemini: Double trouble is in the offing for those who buy used equipment without checking the software ownership package.

Used telephone systems are finding a nice market through other users and brokers of second-hand equipment. And small companies or those with satellite locations like the notion of buying equipment inexpensively.

As this market grows, so does the danger of running afoul of the software contract.

Users should always check the original purchase contract to see who owns the software for the system. It may be the seller that owns it. That's fine.

However, most companies license the use of the software to the original owner only. The great buy that users of second-hand equipment thought they were getting can disappear if they have to pay a software license fee.

There is also the problem of service. Software in service without a relicense fee is not entitled to service or training assistance.

Gemini, you are a person of both thought and action. So remember to check on your software license, and include it in your planning to dispose of your equipment.



HOW AT&T HELPS MAKE EQUIPMENT FLY FOR U.S. LEASING.

U.S. Leasing is the nation's largest independent company leasing office equipment, medical equipment, fleets of cars, railroad rolling stock, and even airplanes. How did they grow so big? Speed, efficiency, and knowledgeability. In a word, service. So, to increase their speed, efficiency and knowledgeability U.S. Leasing called in AT&T.

No longer will a customer have to wait for a U.S. Leasing employee to call her back with information before completing her transaction. No longer will the employee have to leave his desk to seek credit, equipment, maintenance, and contract data from separate sources.

Now, with AT&T 800 Service and the integrated voice and data communications provided by AT&T System 85 and AT&T Personal Terminal 510, the U.S. Leasing employee can access all the information from several mainframes and respond to the customer right from the Personal Terminal 510 screen.

So far, this has meant an increase of 2.5 hours a day per employee at the desk. Time well spent handling customer inquiries, pursuing new business, managing lease renewals, and finding new ways to serve customers better.

U.S. Leasing intends to grow with AT&T, linking more AT&T System 75s and terminals in their smaller offices, creating a single pool of information. So the whole company can communicate from a single database.

AT&T makes all the pieces fit.

To find out how AT&T can help you use communications to achieve your business goals, call us at 1 800 247-1212.

AT&T
The right choice.